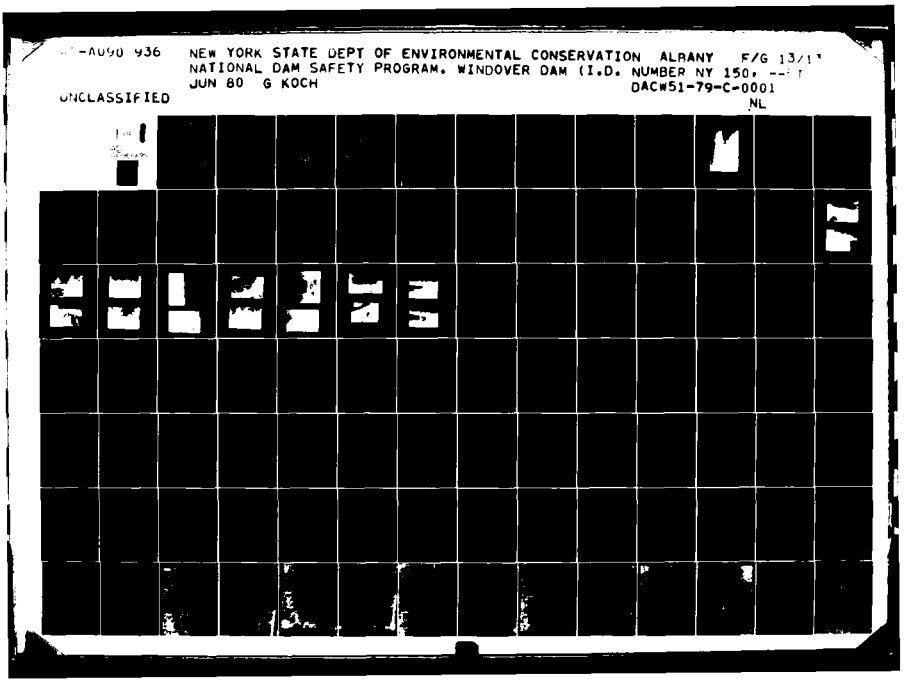

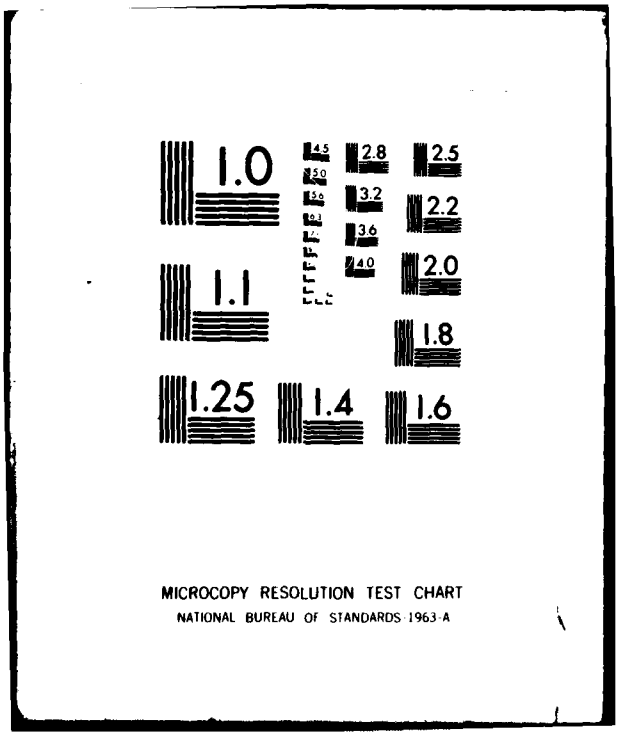
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REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A090936 / 3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Phase I Inspection Report Windover Dam Upper Hudson River Basin, Warrow County, New York Inventory No. 150	5. TYPE OF REPORT & PERIOD COVERED Phase I Inspection Report National Dam Safety Program / 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) George Koch	8. CONTRACT OR GRANT NUMBER(s) ✓ DACW-51-79-C-0001
9. PERFORMING ORGANIZATION NAME AND ADDRESS New York Department of Environmental Conservation 50 Wolf Road Albany, NY. 12233 ✓	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS New York State Department of Environmental Conservation 50 Wolf Road Albany, NY 12233	12. REPORT DATE 2 June 1980 / 13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) Department of the Army 26 Federal Plaza New York District, CofE New York, NY 10287	15. SECURITY CLASS. (of this report) UNCLASSIFIED / 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

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18. SUPPLEMENTARY NOTES

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dam Safety
National Dam Safety Program
Visual Inspection
Hydrology, Structural Stability
Windover Dam
Warren County
Baker Brook

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.

The examination of documents and the visual inspection of Windover Dam did not reveal conditions which constitute an immediate hazard to human life or property. However, the dam has some deficiencies which require further investigation and remedial action.

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

Using the Corps of Engineers "screening criteria" for the initial review of spillway adequacy, it has been determined that the embankment would be overtopped for all storms in excess of 37% of the PMF (Probable Maximum Flood). The spillway is, therefore, adjudged as "seriously inadequate" and the dam is assessed as unsafe, non-emergency.

The classification of "unsafe" applied to a dam because of a "seriously inadequate" spillway is not meant to connote the same degree of emergency as would be associated with an "unsafe" classification applied for a structural deficiency. It does mean that there appears to be a serious deficiency in spillway capacity and if a severe storm were to occur, overtopping and failure of the dam could take place, significantly increasing the hazard to loss of life downstream of the dam.

It is, therefore recommended that within 3 months of notification to the owner, detailed hydrological hydraulic investigations of the structure should be undertaken to more accurately determine the site specific characteristics of the watershed and their affect upon the overtopping potential of the dam. The results of these investigations will determine the appropriate remedial measures which will be required to achieve a spillway capacity adequate to discharge the outflow from at least the 1/2 PMF. In the interim, a detailed emergency action plan must be developed and implemented during periods of unusually heavy precipitation. Also, around-the-clock surveillance of the structure must be provided during these periods.

The structural stability analysis indicates that the factors of safety are not acceptable, therefore, an investigation of the structural stability of the spillway portion of the dam is required. This investigation will determine the type and extent of remedial measures required.

In addition the dam has a number of problem areas, which if left uncorrected have the potential for the development of hazardous conditions and must be corrected within 1 year. These areas are:

1. Monitor the downstream slope of the right embankment at bi-weekly intervals to ascertain if movement is ongoing.

2. Monitor the seepage at the toe of the slope of the right embankment at bi-weekly intervals with the aid of weirs.

3. Repair the eroded upstream slope with riprap.

4. Backfill the depressions observed at the toe of the left embankment, and at the crest of the embankment adjacent to the spillway walls. Also repair the eroded areas adjacent to the downstream toe of the spillway buttresses with riprap.

5. Repair all cracked concrete and recaulk all joints.

6. Return the reservoir drain to operating condition.

7. Remove all tree and brush growth on the embankment surfaces and along the banks of the immediate downstream channel. Provide a program of periodic cutting and mowing of the embankment surfaces and downstream channel.

UPPER HUDSON RIVER BASIN

WINDOVER DAM

WARREN COUNTY NEW YORK
INVENTORY NO. N.Y. 150

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

NEW YORK DISTRICT CORPS OF ENGINEERS

MARCH 1980

CONTRACT NO. DACW-51-79-C0001

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
WINDOVER DAM (I.D. No. NY 150, DEC #186-1322) UPPER HUDSON RIVER BASIN
WARREN COUNTY, NEW YORK

Phase I Inspection Report

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Phase I Inspection Report
National Dam Safety Program

Name of Dam:	Windover I.D. No. NY 150
State Located:	New York
County:	Warren
Watershed:	Upper Hudson River
Stream:	Baker Brook (trib. of North Creek)
Dates of Inspection:	November 29 and December 6, 1979

[From p. 1]

ASSESSMENT

The examination of documents and the visual inspection of Windover Dam did not reveal conditions which constitute an immediate hazard to human life or property. However, the dam has some deficiencies which require further investigation and remedial action.

Using the Corps of Engineers "screening criteria" for the initial review of spillway adequacy, it has been determined that the embankment would be overtopped for all storms in excess of 37% of the PMF (Probable Maximum Flood). The spillway is, therefore, adjudged as "seriously inadequate" and the dam is assessed as unsafe, non-emergency.

The classification of "unsafe" applied to a dam because of a "seriously inadequate" spillway is not meant to connote the same degree of emergency as would be associated with an "unsafe" classification applied for a structural deficiency. It does mean that there appears to be a serious deficiency in spillway capacity and if a severe storm were to occur, overtopping and failure of the dam could take place, significantly increasing the hazard to loss of life downstream of the dam.

It is, therefore recommended that within 3 months of notification to the owner, detailed hydrological hydraulic investigations of the structure should be undertaken to more accurately determine the site specific characteristics of the watershed and their affect upon the overtopping potential of the dam. The results of these investigations will determine the appropriate remedial measures which will be required to achieve a spillway capacity adequate to discharge the outflow from at least the 1/2 PMF. In the interim, a detailed emergency action plan must be developed and implemented during periods of unusually heavy precipitation. Also, around-the-clock surveillance of the structure must be provided during these periods.

The structural stability analysis indicates that the factors of safety are not acceptable, therefore, an investigation of the structural stability of the spillway portion of the dam is required. This investigation will determine the type and extent of remedial measures required.

In addition the dam has a number of problem areas, which if left uncorrected, have the potential for the development of hazardous conditions and must be corrected within 1 year. These areas are:

1. Monitor the downstream slope of the right embankment at bi-weekly intervals to ascertain if movement is ongoing.

2. Monitor the seepage at the toe of the slope of the right embankment at bi-weekly intervals with the aid of weirs.

3. Repair the eroded upstream slope with riprap.

4. Backfill the depressions observed at the toe of the left embankment, and at the crest of the embankment adjacent to the spillway walls. Also repair the eroded areas adjacent to the downstream toe of the spillway buttresses with riprap.

5. Repair all cracked concrete and recaulk all joints.

6. Return the reservoir drain to operating condition.

7. Remove all tree and brush growth on the embankment surfaces and along the banks of the immediate downstream channel. Provide a program of periodic cutting and mowing of the embankment surfaces and downstream channel.

8. Provide a program of periodic inspection and maintenance of the dam and appurtenances, including yearly operation and lubrication of the reservoir drain system. Document this information for future reference. The aforementioned emergency action plan should be maintained and updated periodically during the life of the structure.

George Koch
Chief, Dam Safety Section
New York State Department
of Environmental Conservation --
NY License No. 45937

Approved By:

Col. Clark H. Benn
New York District Engineer

Date: 2 June 80

Photo #1
Overview of Windover Dam

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
WINDOVER DAM I.D. No. NY 150
DEC #186-1322 UPPER HUDSON RIVER BASIN
WARREN COUNTY, NEW YORK

SECTION 1: PROJECT INFORMATION

1.1 GENERAL

a. Authority
The Phase I inspection reported herein was authorized by the Department of the Army, New York District, Corps of Engineers, to fulfill the requirements of the National Dam Inspection Act, Public Law 92-367.

b. Purpose of Inspection
Evaluation of the existing conditions of the subject dam to identify deficiencies and hazardous conditions, determine if they constitute hazards to human life and property and recommend measures where necessary.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances
Windover dam consists of 2 earth embankments abutting a 140 feet long concrete capped masonry spillway, the maximum height of which is 15 feet. The left embankment is 75 feet long and the right embankment is 125 feet long. The crest width is 5 feet. The upstream slope is 1 vertical on 3 horizontal and the downstream slope is 1 on 2. A reservoir drain is located near the left end of the spillway.

b. Location
The dam is located on Baker Brook, a tributary North Creek and the Hudson River, approximately 0.5 miles west of the Village of Sodom, New York.

c. Size
The dam is 15 feet high and impounds approximately 500 acre-feet. The dam is classified as "small" in size.

d. Hazard Classification
The dam is classified as high hazard because of its location, about 0.5 miles above the Village of Sodam, New York.

e. Ownership
The dam is owned and operated by Messers Thomas, Stewart and H.B. Hudnut. Mr. H.B. Hudnut Jr. resides at 27 Horicon Avenue, Glens Falls, New York 12801. Tel: (518)793-6922.

f. Purpose of Dam
The dam is used for recreational purposes.

g. Design and Construction History

The dam was constructed about 1916 to form a trout pond and provide power for a small saw mill. Between 1927 and 1931, 4 feet of concrete was added to the height of the spillway to increase the lake size. The dam was reported to have failed in 1943 during a flash flood. No record of loss of life or property damage was reported. In 1948 the dam was extensively reconstructed by B.A. Burton, Contractor, Brant Lake, N.Y. under the direction of the owner W.H. Hudnut, Jr.

h. Normal Operating Procedures

All flows are discharged over the spillway. The reservoir drain system is not operational.

1.3 PERTINENT DATA

a. Drainage Area (sq. mi.)	8.0
b. Elevations (ft. USGS Datum)	
Top of Dam	1514.0
Spillway Crest	1510.0
Invert of Reservoir Drain	N/A
c. Reservoir (acres; acre ft.)	
Surface Area @ Top of Dam	105. Acres
Surface Area @ Spillway Crest	99.6 Acres
Storage @ Top of Dam	855. Acre Ft.
Storage @ Spillway Crest	505. Acre Ft.

d. Dam

Type: Homogeneous earth with concrete core wall.

Length (ft):	200.
Upstream Slope:	1:3
Downstream Slope:	1:2
Crest Width (ft):	5.0

e. Spillway

Type: Ungated, masonary and stone crest with a concrete cap.

Weir length (ft):	140.0
Spillway Capacity @ Top of Dam (cfs):	4032.0

f. Reservoir Drain: original sluice was plugged with concrete; presently there is a reported metal pipe in place of the sluice but is bolted closed therefore inoperable in case of emergency draw-down.

SECTION 2: ENGINEERING DATA

2.1 GEOLOGY

Windover Dam is located in the "Adirondack Highlands" physiographic province of New York State. The highest mountains in the State occur in this province, with an average relief of 2,000 feet. North, west, and south of the High Peaks region (east-central part of the province) elevations decrease gradually; east to the Champlain lowland, the slope is more abrupt. The Adirondacks are transacted by long, northeast - southwest lineaments, representing shear zones or major falts. The lineaments frequently control drainage and the shape of land forms. Many lakes follow geologic contacts, or are confined to valleys along weak metasedimentary rocks. Because glacial deposits have clogged the normal radial drainage, lower areas are dotted with lakes, ponds, and swamps.

The landforms present are largely bedrock-controlled. The High Peaks are underlain solely by anorthosite. The remainder of the Central Highlands is composed of granite and syenitic gneisses which are not as erosion resistant as the High Peaks. Metasedimentary rocks, the least resistant type of rocks, are more local in distribution and occur in valleys. The "landforms and Bedrock Geology of New York State" map prepared by the University of the State of New York indicates that the bedrock in the vicinity of the dam is Metasedimentary and Metavolcanic rocks (marble, calc-silicate rocks, quartzite and various para gneisses) of Precambrian origin (prior to 570 million years ago). Their sedimentary precursors limestones, impure limestones, quartz sandstones, and shales respectively- originally were deposited as horizontal beds in a shallow sea.

2.2 SUBSURFACE INVESTIGATION

No subsurface investigation could be located for the dam. However, the "General Soil Map of New York State" prepared by the Cornell University Agriculture Experiment Station indicates that the surficial soils in the vicinity of the dam are Becket, Berkshire and Potsdam soils of glacial till origin.

These soils are formed on mostly thick glacial till from the aforementioned bedrock types (see 2.1 Geology). The soils are stony and bouldery silty sands. Overall drainage is good, but due to the lack of clay type particles soil erosion is common. Permeability is moderate to rapid.

2.3 DAM AND APPURTENANT STRUCTURES

The dam was constructed about 1916 and consisted of a masonry and concrete structure approximately 10 feet in height. A moulded concrete sluice served as a reservoir drain near the left end of the spillway. An additional sluice at the extreme left end of the spillway served as an intake for a 2 feet square penstock, which supplied a small sawmill. This mill was located immediately below the dam at the left abutment. Ice damage during the spring of 1918 necessitated repairs to the dam. Between 1927 and 1931, 4 feet of concrete was added to the spillway. Subsequent to a failure of the dam (right masonry portion) during a storm in 1943, the structure was rebuilt (1948) incorporating earth embankments in the construction. These embankments were placed on the upstream and downstream sides of the remaining

portions of the masonry sections of the dam.

2.4 CONSTRUCTION RECORDS

The limited construction and reconstruction information which is available is included in Appendix F, Drawings.

2.5 OPERATION RECORD

No operation information is available.

2.6 EVALUATION OF DATA

Some of the data presented in this report has been made available by Dr. Herbert B. Hudnut, Jr. This information has been invaluable in preparation of this report and appears adequate and reliable for Phase I Inspection purposes.

SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

a. General

Visual inspection of Windover Dam and the surrounding watershed was conducted on November 29 and December 6, 1979. The weather was partly cloudy and the temperature ranged in the thirties. The reservoir level at the time of the inspections was approximately 1510.25 or 0.25 feet above the spillway crest.

b. Embankment

The earth embankment shows certain signs of distress which require monitoring to determine the severity of the problem area. The upstream slope is eroded from wave action above spillway crest elevation. (See Photos #6, 7, & 10) Trees on the upstream slope were evident, and one of these, near the right spillway buttress, was undermined and bowed (See Photos #1, 3 & 10) indicating movement of the root system during its life. On the downstream slope of the right embankment near the spillway numerous mature trees were bowed (See Photo #11), also indicating some past movement of the slope. No evidence could be discovered which would indicate that any current movement is in progress. This area was reported to have experienced a failure during a 1943 storm. The area was rebuilt in 1948 and no further problems were reported.

The downstream slope of the left embankment appears to be steeper than that of the right embankment, which may be the cause of an erosion area beginning at the crest of the dam and extending toward the toe of slope. (See Photo #8) Removal of trees and seeding of the area should eliminate this problem. At the toe of the dam several depressions were observed near the roots of a tree. (See Photo #9) No active movement or seepage could be discerned. Since this area was in the vicinity of the foundation for the old sawmill the depressions could be related to settlement around its foundation.

The crest of the embankments appears to be in good condition. Some distortion of the embankment crest near the spillway buttresses was noted. During discussions with the owner, it was learned that the owner had excavated in this area, attempting to locate the core wall. The core wall was discovered in the right embankment, but not in the left.

c. Seepage

Seepage was observed eminating from an area near the toe of the right embankment beneath a pile of brush. The flow, estimated to be 2 to 3 gallons per minute, had a rusty appearance. However, no migration of fines could be discerned. (See Photo #12)

d. Spillway

The spillway is a concrete capped masonry structure located between the two earth embankments. (See Photos #1 thru 5) The spillway is generally in good condition with only some minor evidence of concrete cracking. The left spillway buttress, on the upstream side, was tipped toward the spillway approximately 1/4 inch. No evidence of current movement was apparent.

e. Reservoir Drain

The reservoir drain, located near the left side of the spillway, was reconstructed in 1948. This drain has not been operated for many years. A detailed inspection of the drain could not be conducted due to the spillway discharge.

f. Downstream Channel

The downstream channel immediately below the dam is bouldery and overgrown with trees. (See Photo #13) Some erosion of the original grade below the spillway buttresses was observed. This erosion is believed to be due to the flow restrictive nature of the boulders and vegetation.

g. Reservoir

There are no visible signs of instability or sedimentation problems in the reservoir area.

3.2 EVALUATION OF OBSERVATIONS

Significant conditions were observed which require investigation to determine if remedial action is required to insure the stability of the dam and appurtenances. The following is a summary of the problem areas encountered, in order of importance, with the appropriate recommended action:

1. The bowing of trees on the right embankment near the spillway indicate that movement of the slope has occurred. This area should be monitored at bi-weekly intervals with the aid of survey equipment to asertain if ongoing movement is occurring.

2. The seepage observed at the toe of the right embankment, should be monitored at bi-weekly intervals with the aid of weirs. If the flow rate increases significantly or migration of fines occurs, immediate remedial measures will be required to control this seepage.

3. The upstream slope at the normal reservoir level is eroded due to wave action. This area should be ripraped to prevent further erosion.

4. The depressions observed at the toe of the left embankment should be backfilled.

5. The concrete elements of the spillway are cracked and the joints are not caulked. Repair all deteriorated areas during low flow periods and recaulk all joints.

6. The areas of the earth embankments adjacent to the spillway buttresses are depressed. Backfill these areas so that the crest is flush with the top of the buttresses.

7. The reservoir drain is not operational. Restore this system to operating condition.

8. The areas below the spillway buttresses (downstream side) are eroding due to spillway discharges. Repair these areas with riprap.

9. Considerable vegetation was observed growing on the embankments and in the downstream channel. Remove this vegetation and provide a program of periodic cutting and mowing of the embankment surfaces and the downstream channel.

SECTION 4: OPERATION AND MAINTENANCE PROCEDURE

4.1 PROCEDURES

The normal water surface is approximated by the spillway crest, Elevation 1510±.

4.2 MAINTENANCE OF THE DAM

The dam is maintained by the owners, the Hudnut family. Maintenance of the dam is not considered satisfactory as evidenced by the erosion of the upstream face, extensive tree growth, inoperative reservoir drain and deterioration of concrete elements of the spillway.

4.3 WARNING SYSTEM

There is no warning system in effect or in preparation.

4.4 EVALUATION

The dam and appurtenances have not been maintained in satisfactory condition as noted in "Section 3: Visual Inspection."

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 DRAINAGE AREA

Windover Lake Dam is located on the Baker Brook approximately 1/2 mile west of Sodom, Warren County, New York. The total drainage at the dam is 8.01 square miles. The topography is moderately steep with two well defined drainage paths.

5.2 ANALYSIS CRITERIA

The analysis of the spillway capacity of the dam and storage of the reservoir was performed using the Corps of Engineers HEC-1 computer program, incorporating the "Snyder Synthetic Unit Hydrograph" method, and the "Modified Puls" flood routing procedure. The floods selected for analysis were the PMF and 1/2 PMF in accordance with the recommended guidelines of the Corps of Engineers.

5.3 SPILLWAY CAPACITY

The Windover Lake spillway is an ungated, concrete capped weir, 5 feet in width, 140 feet long. The structure was rebuilt in 1948 after it had breached in June 1943.

The spillway has a capacity of 3700 cfs at top of dam which is 37% of the computed PMF, which is 9920 cfs. The dam is overtopped by approximately 2.3 feet during the PMF event.

5.4 RESERVOIR CAPACITY

Capacity to normal elevation is 505 acre-feet. Surcharge storage to top of dam is an additional 350 acre-feet, creating a total storage capacity of 855 acre feet to top of dam. The surcharge storage between the spillway crest and top of dam is equivalent to .82 inches of runoff.

5.5 FLOODS OF RECORD

There have been no recorded events since the dam was rebuilt in 1948. However, shortly before the dam was inspected on November 29, 1979 there was a major storm event in the eastern Adirondack region where it was estimated that the spillway was flowing approximately 2 feet deep or 1190 cfs.

5.6 OVERTOPPING POTENTIAL

The PMF analysis indicates the dam will be overtopped by 2.3 feet during the PMF, and 0.51 feet during the 1/2 PMF. During either of these magnitude of floods it is felt that the bridges on Chatiemac Road and the low lying homes along Peaceful Valley Road would be inundated.

5.7 EVALUATION

The spillway is inadequate to pass 1/2 the PMF of 4817 cfs. The previous breaching caused no loss to life or property but some development downstream has taken place increasing the potential danger.

The spillway, therefore, is adjudged as "seriously inadequate", and the dam is assessed as unsafe, non-emergency.

SECTION 6: STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observation

Signs of distress were observed in connection with the right earth embankment. The bowed trees near the right spillway buttress indicate that movement of the slope has occurred in the past. Careful inspection of the slope did not reveal any condition which would indicate that this movement is current or ongoing.

b. Design and Construction Data

No information could be located regarding the structural stability of the structure.

c. Operating Records

No operating problems were reported which would affect the stability of the dam.

d. Post Construction Changes

The dam was repaired in 1918 when ice damaged the structure. Between 1927 and 31, 4 feet of concrete was placed to increase the lake size. In 1948 the dam was reconstructed due to a failure of the structure during a storm in 1943.

6.2 STRUCTURAL STABILITY ANALYSIS

A structural stability analysis was conducted for the spillway portion of the dam. The results of the analysis are as follows:

Case	Description of Loading Conditions
1	Normal Operating Conditions, reservoir at El. 1510 full uplift, no tailwater
2	Same as Case I, 7.5 kips/L.F. ice load
3	Water at 1/2 PMF level (El. 1514.4), uplift as in Case I, tailwater = 2 feet
4	Water at PMF level (El. 1516.3), uplift as in Case I tailwater = 3 feet
5	Normal Operating Conditions as in Case I with Seismic forces of 0.1 (Seismic Zone 3)

Case	Factor of Safety Overturning	Location of Resultant from Toe	Factor of Safety Sliding
1	2.00	3.5	2.2
2	0.79	-1.8	1.1
3	1.13	0.8	1.0
4	0.94	-0.5	0.8
5	1.59	2.6	1.5

Location of Middle 1/3 is 3.67 to 7.33 feet from the toe.

These results indicate that the spillway portion analyzed does not meet the factors of safety recommended by the Corps of Engineers for any condition. (Resultant must fall within the middle 1/3 and factor of safety for sliding = 3.0.)

Since the structure has withstood ice loading conditions and normal loading conditions without damage, the analysis (which includes available information) may not indicate the true configuration of the structure and the proper loading conditions. Therefore, it is recommended that an in-depth analysis of the structure be conducted, prior to initiation of any remedial actions.

Further information on Structural Stability is included in Appendix E.

SECTION 7: ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety

The Phase I Inspection of Windover Dam revealed that the spillway is "seriously inadequate", based upon the Corps of Engineers "screening criteria", and outflows from any storm in excess of 37% of the PMF will overtop the dam. This overtopping could cause breaching of the dam and the resulting flood-wave would significantly increase the hazard to downstream residents. For these reasons, the dam has been assessed as unsafe, non-emergency.

In addition, the dam has a number of problem areas which if left uncorrected, have the potential for the development of hazardous conditions. These areas are:

1. The unacceptable factors of safety for all loading conditions concerning the structural stability of the spillway portion of the dam.

2. The bowed trees on the downstream slope of the right embankment indicate that movement of the slope has occurred.

3. Seepage encountered at the toe of the right embankment below the bowed tree area may be associated with the movement of the slope.

b. Adequacy of Information

The information reviewed is considered adequate for Phase I Inspection purposes.

c. Need for Additional Investigations

Since the spillway is considered to be "seriously inadequate", additional hydrologic/hydraulic investigations are required to more accurately determine the site specific characteristics of the watershed. After the in-depth hydrologic/hydraulic investigations have been completed, remedial measures must be initiated to provide spillway capacity sufficient to discharge the outflow from the 1/2 PMF event. In addition, an investigation of the structural stability of the spillway portion of the dam is required.

d. Urgency

The additional hydrologic/hydraulic investigations and the stability investigation which are required must be initiated within 3 months from the date of notification. Within 1 year of notification, remedial measures as a result of these investigations must be initiated, with completion of these measures during the following year. In the interim, develop an emergency action plan for the notification of downstream residents and proper governmental authorities in the event of overtopping and provide round-the-clock surveillance of the dam during periods of extreme run-off. The other problem areas listed below must be corrected within 1 year from notification.

7.2 RECOMMENDED MEASURES

1. The results of the aforementioned investigations will determine the appropriate remedial actions required.

2. Monitor the downstream slope of the right embankment at bi-weekly intervals with the aid of survey equipment to ascertain if movement is occurring.

3. Monitor the seepage at the toe of the downstream slope of the right embankment at bi-weekly intervals with the aid of weirs. If flow rates increase significantly or migration of fines occurs, immediate remedial measures will be required to control this seepage.

4. Repair the eroded upstream slope with riprap to prevent further deterioration from wave action.

5. Backfill the depressions observed at the toe of the left embankment and at the crest of both embankments adjacent to the spillway.

6. Repair all concrete areas which are cracked and recaulk all joints.

7. Return the reservoir drain to operating conditions.

8. Repair the eroded areas at the downstream toe of the spillway buttresses.

9. Remove all vegetative growth from the embankment surfaces and along the banks of the immediate downstream channel. Provide a program of periodic cutting and mowing of the embankment surfaces.

10. Provide a program of periodic inspection and maintenance of the dam and appurtenances, including yearly operation and lubrication of the reservoir drain system. Document this information for future reference. The emergency action plan described in section 7.1d should be maintained and updated periodically during the life of the structure.

APPENDIX A

PHOTOGRAPHS

Photo #2
Spillway - Downstream Face

Photo #3
Spillway - Crest

Photo #4
Downstream Channel
Note Debris

Photo #5
Right Abutment of Spillway
Note Debris

Photo #6
Left Embankment
(pointing to high water mark)

Photo #7
Erosion of Left Embankment
Upstream Face

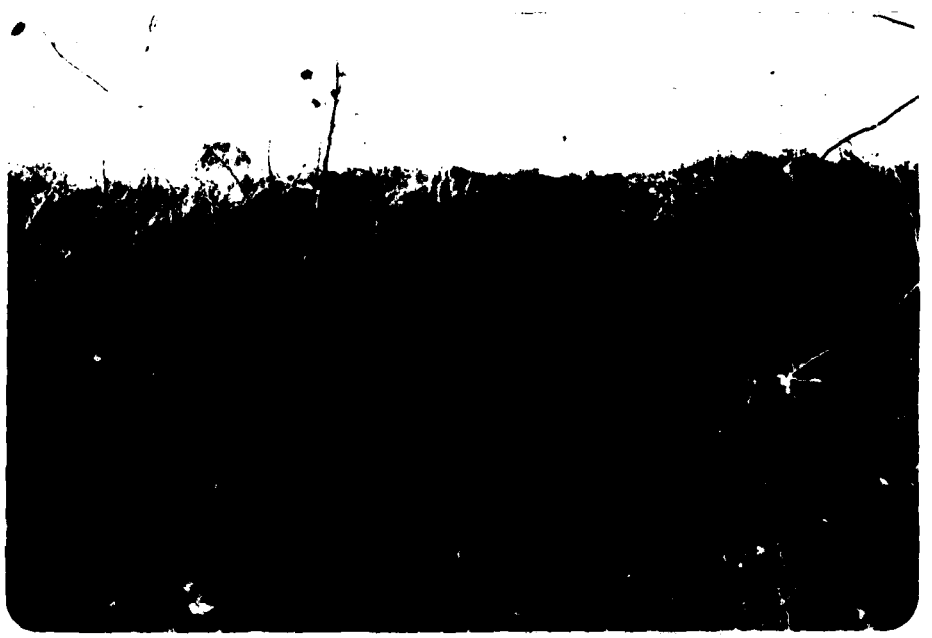

Photo #8
Left Embankment
Erosion of Downstream Face

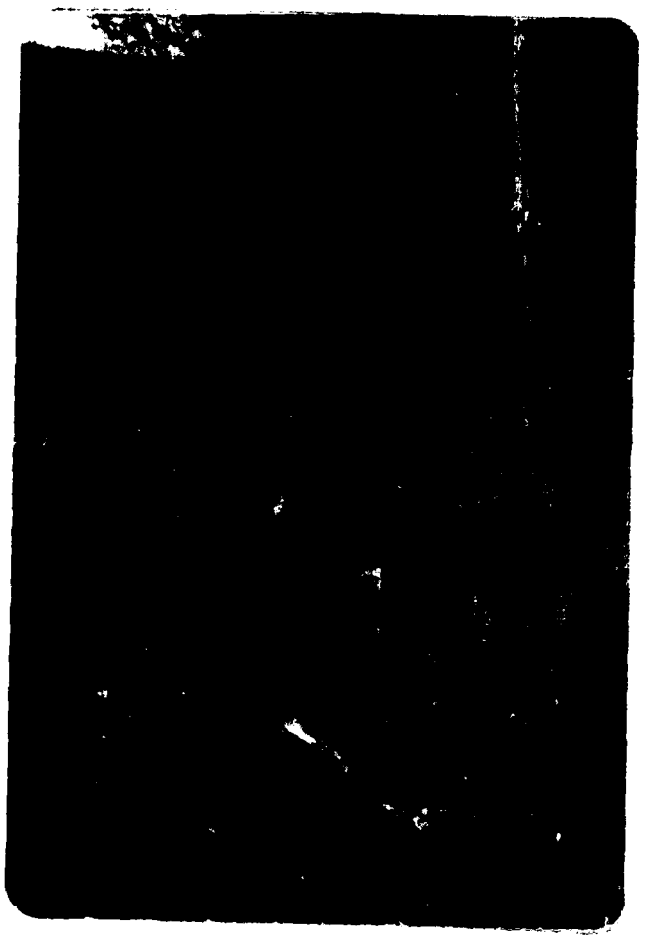

Photo #9
Depression at toe of
Left Embankment

Photo #10
Right Embankment
Erosion of Upstream Face

Photo #11
Downstream Face Right Embankment
Note Bowed Trees

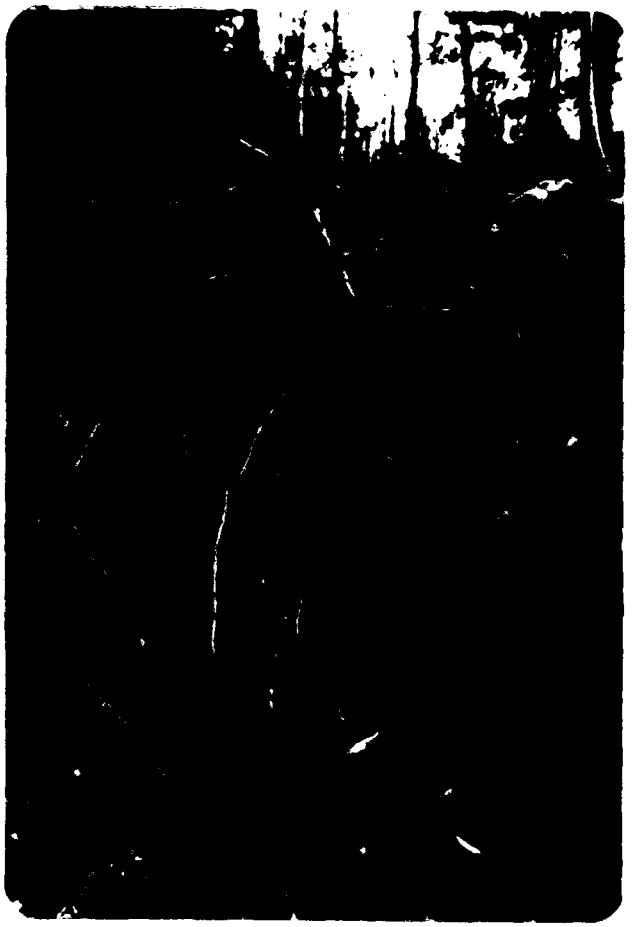

Photo #12
Seepage at toe of Right Embankment
Note rusty color

Photo #13
Downstream Channel

Old Photo Dated 1920
Downstream Face of Spillway
(Old Mill at Right)

Spillway Downstream Face
Dated August 20, 1970

Old Photos Dated 1946
Upstream Face
Note Breach at right end of spillway

APPENDIX B

VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST

1) **Basic Data**

a. **General**

Name of Dam Windover (Formerly Ross Lake)

Fed. I.D. # 150 DEC Dam No. 186-1322

River Basin Upper Hudson

Location: Town Johnsburg County Warren

Stream Name Baker Brook

Tributary of North Creek & Upper Hudson

Latitude (N) 43° 36.1' Longitude (W) 74° 00.2'

Type of Dam 2 Earth embankments abutting a concrete capped masonry spillway

Hazard Category "C" - High

Date(s) of Inspection 11/29/79 & 12/6/79

Weather Conditions Partly Cloudy Temp = 30's

Reservoir Level at Time of Inspection 0.25 feet above spillway crest

b. **Inspection Personnel** J.C. Veitch R.P. McCord

c. **Persons Contacted (Including Address & Phone No.)**

Herbert B. Hudnut Jr. 27 Horicon Ave

Glens Falls, NY 12801

(518) 793-6922 home / office 793-6610

d. **History:**

Date Constructed 1916 Date(s) Reconstructed 1918 (March) Ice Damage

1927-31 Raised dam by 4'

Designer Unknown Failure in 1943 required major reconstruction completed in 1948

Constructed By engineer owner Ellsworth Ross

Owner: Thomas, Stewart and Herbert Hudnut.

2) Embankment

a. Characteristics

(1) Embankment Material silty sand, boulders

(2) Cutoff Type unknown - possibly old masonry dam

(3) Impervious Core concrete core wall 1 ft thick

(4) Internal Drainage System none

(5) Miscellaneous

b. Crest

(1) Vertical Alignment appears good except where adjacent to spillway buttresses / corner has excavated to locate core wall.

(2) Horizontal Alignment appears good

(3) Surface Cracks none evident

(4) Miscellaneous

c. Upstream Slope

(1) Slope (Estimate) (V:H) 1 : 3

(2) Undesirable Growth or Debris, Animal Burrows numerous trees near water line

(3) Sloughing, Subsidence or Depressions trees have bowed shape indicating movement of root system. possible undercutting from wave action. wave action has created a step in the slope near normal water level

(4) Slope Protection plans indicate that riprap was called for - none evident however

(5) Surface Cracks or Movement at Toe unobservable

d. Downstream Slope

(1) Slope (Estimate - V:H) ~ 1:2

(2) Undesirable Growth or Debris, Animal Burrows trees and brush some cutting of brush was piled near right spillway buttress

(3) Sloughing, Subsidence or Depressions erosion near crest on left emb depressions at toe of left emb. (possibly due to old mill) evidence of tire tracks on right emb in vicinity of depressions - no indication of cracks/movement or cracks.

(4) Surface Cracks or Movement at Toe none evident - trees bowed on right emb slope

(5) Seepage 2-3 gpm emanating from right embankment toe area (beneath pile of brush) area surrounding flow has a rusty appearance (no migration of fines)

(6) External Drainage System (Ditches, Trenches; Blanket) none

(7) Condition Around Outlet Structure see spillway some erosion of grade behind spillway retaining walls

(8) Seepage Beyond Toe none evident

e. Abutments - Embankment Contact

earth abutments appear to be in good condition

(1) Erosion at Contact none evident

(2) Seepage Along Contact none evident

3) Drainage System

a. Description of System none

b. Condition of System

c. Discharge from Drainage System

4) Instrumentation (Momumentation/Surveys, Observation Wells, Weirs, Piezometers, Etc.)

none

5) **Reservoir**

a. Slopes appear stable

b. Sedimentation no problems reported

c. Unusual Conditions Which Affect Dam

6) **Area Downstream of Dam**

a. Downstream Hazard (No. of Homes, Highways, etc.)

Village of Solon ≈ ½ mile below dam

b. Seepage, Unusual Growth seepage areas evident

numerous trees & brush - should be removed

c. Evidence of Movement Beyond Toe of Dam

none evident

d. Condition of Downstream Channel boulders & trees in channel

7) **Spillway(s) (Including Discharge Conveyance Channel)**

a. General concrete capped masonry spillway 190' wide

b. Condition of Service Spillway Some minor cracking of the spillway crest and buttresses was observed. The left buttress upstream wall appears to have moved ¾" toward spillway - monitor & reseal joint - Patch up all cracks & reseal all joints.

c. Condition of Auxiliary Spillway _____

Dam

d. Condition of Discharge Conveyance Channel _____

boulders & trees in downstream channel

8) Reservoir Drain/Outlet

Type: Pipe _____ Conduit ↘ Other _____

Material: Concrete ↘ Metal _____ Other _____

Size: _____ Length _____

Invert Elevations: Entrance _____ Exit _____

Physical Condition (Describe): Unobservable ↘

Material: _____

Joints: _____ Alignment _____

Structural Integrity: _____

Hydraulic Capability: _____

Means of Control: Gate _____ Valve _____ Uncontrolled _____

Operation: Operable _____ Inoperable ↘ Other _____

Present Condition (Describe): Design has not been

expected low flow pipe

9) Structural

a. Concrete Surfaces generally good condition

b. Structural Cracking some minor cracking of spillway crest & buttresses

c. Movement - Horizontal & Vertical Alignment (Settlement) no significant movement evident

d. Junctions with Abutments or Embankments appears good

e. Drains - Foundation, Joint, Face none

f. Water Passages, Conduits, Sluices reservoir drain unobservable

g. Seepage or Leakage none other than seepage shown where observed - spillway flow observed detailed inspection.

h. Joints - Construction, etc. joints require repointing

i. Foundation unobservable

j. Abutments relatively good condition

k. Control Gates none

l. Approach & Outlet Channels approach unobservable
outlet is natural boulder channel

m. Energy Dissipators (Plunge Pool, etc.) boulders in downstream channel

n. Intake Structures none

o. Stability appears adequate

p. Miscellaneous

10) Appurtenant Structures (Power House, Lock, Gatehouse, Other)

a. Description and Condition

None

APPENDIX C

HYDROLOGIC / HYDRAULIC

ENGINEERING DATA AND COMPUTATIONS

CHECK LIST FOR DAMS
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

AREA-CAPACITY DATA:

	Elevation (ft.)	Surface Area (acres)	Storage Capacity (acre-ft.)
1) Top of Dam	1514.0	105	855
2) Design High Water (Max. Design Pool)	—	—	—
3) Auxiliary Spillway Crest	—	—	—
4) Pool Level with Flashboards	—	—	—
5) Service Spillway Crest	1510.0	100	505

DISCHARGES

	Volume (cfs)
1) Average Daily	10 cfs.
2) Spillway @ Maximum High Water	3696 cfs
3) Spillway @ Design High Water	—
4) Spillway @ Auxiliary Spillway Crest Elevation	—
5) Low Level Outlet	N/A
6) Total (of all facilities) @ Maximum High Water	3696 cfs.
7) Maximum Known Flood	—
8) At Time of Inspection	60 cfs

CREST: ELEVATION: 1510.0

Type: Concrete capped (broad crested weir)

Width: 5.0' Length: 140.0'

Spillover —

Location Southeastern Corner of Windover Lake
CENTERED ON DAM (over original streambed)

SPILLWAY:

SERVICE		AUXILIARY
1510.0	Elevation	—
br. crested weir	Type	—
5.0'w 140.0'l	Width	—
	Type of Control	
✓	Uncontrolled	—
	Controlled:	
—	Type (Flashboards; gate)	—
—	Number	—
—	Size/Length	—
	Invert Material	—
	Anticipated Length of operating service	—
—	Chute Length	—
—	Height Between Spillway Crest & Approach Channel Invert (Weir Flow)	—

HYDROMETEROLOGICAL GAGES:

Type : none

Location: —

Records:

Date -

Max. Reading -

FLOOD WATER CONTROL SYSTEM:

Warning System: none

Method of Controlled Releases (mechanisms):

original sluice plugged

DRAINAGE AREA: 8.01 mi²

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: Rural, Wooded.

Terrain - Relief: moderate to steep slopes (Adirondack Region)

Surface - Soil: silty SAND

Runoff Potential (existing or planned extensive alterations to existing (surface or subsurface conditions)

Potential Sedimentation problem areas (natural or man-made; present or future)

NONE CHANGES to continual SEDIMENTATION

Potential Backwater problem areas for levels at maximum storage capacity including surcharge storage:

NONE

Dikes - Floodwalls (overflow & non-overflow) - Low reaches along the Reservoir perimeter:

Location: NONE

Elevation:

Reservoir:

Length @ Maximum Pool .7 (Miles)

Length of Shoreline (@ Spillway Crest) 1.5 (Miles)

```
**********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION     JULY 1978
  LAST MODIFICATION  26 FEB 79
  MODIFIED FOR HONEYWELL APR 79
**********************************
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**********************************
NEW YORK STATE
DEPT OF ENVIRONMENTAL CONSERVATION
FLOOD PROTECTION BUREAU
**********************************
```

```
    1                A1   WINDOVER LAKE DAM
    2                A2   PHASE I
    3                A3   PMF
    4                B     200       0      15       0       0       0       0       0       0       0
    5                B1      5
    6                J       1       2       1
    7                J1     .5       1
    8                K       0       1                       2               1
    9                K1   INFLOW FROM BASIN
   10                H       1       1    8.01
   11                P       0    17.6     111     123     133     142
   12                T                                                       1      .1
   13                M    4.30    .625
   14                X   -2.0    -.05       1
   15                K       1       1                       2               1
   16                K1   ROUTE THROUGH RESERVOIR
   17                Y                                       1       1
   18                Y1      1                                               -1510.0      -1
   19                Y4   1510    1512    1514    1516    1518    1520
   20                Y5      0    1190    3696    7201   11087   15495
   21                SS      0     115     340     505     855    1550
   22                SE   1500    1504    1508    1510    1514    1520
   23                SS   1510
   24                SD   1514       3     1.5     200
   25                K      99
   26                A
   27                A
   28                A
   29                A
   30                A
```

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT	1
ROUTE HYDROGRAPH TO	1
END OF NETWORK	

```
**********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
  MODIFIED FOR HONEYWELL APR 79
**********************************

                                    **********************************
                                    NEW YORK STATE
                                    DEPT OF ENVIRONMENTAL CONSERVATION
                                    FLOOD PROTECTION BUREAU
                                    **********************************

RUN  DATE 03/06/80

                    WINDOVER LAKE DAM
                    PHASE I
                    PMF

                                JOB SPECIFICATION
      NO      NHR     NMIN     IDAY     IHR     IMIN    METRC     IPLT     IPRT    NSTAN
     200       0       15        0       0        0        0        0        0        0
                              JOPER      NWT   LROPT   TRACE
                                  5        0       0       0

                          MULTI-PLAN ANALYSES TO BE PERFORMED
                              NPLAN= 1 NRTIO= 2 LRTIO= 1
                RTIOS=   0.50   1.00

**********          **********          **********          **********          **********

                          SUB-AREA RUNOFF COMPUTATION

                INFLOW FROM BASIN
                        ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                            1       0       0       0       2       0       1       0       0

                                HYDROGRAPH DATA
          IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
              1       1    8.01      0.    8.01      0.      0.       0       0       0

                                PRECIP DATA
                      SPFE     PMS      R6     R12     R24     R48     R72     R96
                        0.   17.60  111.00  123.00  133.00  142.00     0.      0.
TRSPC COMPUTED BY THE PROGRAM IS 0.800

                                LOSS DATA
          LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
              0      0.      0.    1.00      0.      0.    1.00    1.00    0.10      0.      0.

                            UNIT HYDROGRAPH DATA
                        TP=  4.30    CP=0.63    NTA=  0

                                RECESSION DATA
                        STRTQ=   -2.00    QRCSN=   -0.05    RTIOR= 1.00
APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC=18.87 AND R=16.05 INTERVALS

      UNIT HYDROGRAPH 96 END-OF-PERIOD ORDINATES, LAG=  4.34 HOURS, CP= 0.63  VOL= 1.00
      11.     41.     83.    134.    190.    251.    315.    381.    450.    515.
     583.    630.    665.    721.    749.    767.    778.    772.    753.    716.
     673.    632.    594.    558.    524.    493.    463.    435.    409.    384.
     361.    339.    318.    299.    281.    264.    248.    233.    219.    206.
     193.    182.    171.    160.    151.    142.    133.    125.    117.    110.
     104.     97.     92.     86.     81.     76.     71.     67.     63.     59.
      56.     52.     49.     46.     43.     41.     38.     36.     34.     32.
```

10. 15. 14. 13. 12. 12. 11. 10. 10. 9.
9. 8. 8. 7. 7. 6.

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	0.15	1	0.00	0.	0.00	16.	1.02	1.15	101	0.02	0.	0.02	30.
1.01	0.30	2	0.00	0.	0.00	16.	1.02	1.30	102	0.02	0.	0.02	30.
1.01	0.45	3	0.00	0.	0.00	16.	1.02	1.45	103	0.02	0.	0.02	29.
1.01	1.00	4	0.00	0.	0.00	16.	1.02	2.00	104	0.02	0.	0.02	28.
1.01	1.15	5	0.00	0.	0.00	16.	1.02	2.15	105	0.02	0.	0.02	27.
1.01	1.30	6	0.00	0.	0.00	16.	1.02	2.30	106	0.02	0.	0.02	27.
1.01	1.45	7	0.00	0.	0.00	16.	1.02	2.45	107	0.02	0.	0.02	26.
1.01	2.00	8	0.00	0.	0.00	16.	1.02	3.00	108	0.02	0.	0.02	25.
1.01	2.15	9	0.00	0.	0.00	16.	1.02	3.15	109	0.02	0.	0.02	25.
1.01	2.30	10	0.00	0.	0.00	16.	1.02	3.30	110	0.02	0.	0.02	24.
1.01	2.45	11	0.00	0.	0.00	16.	1.02	3.45	111	0.02	0.	0.02	24.
1.01	3.00	12	0.00	0.	0.00	16.	1.02	4.00	112	0.02	0.	0.02	23.
1.01	3.15	13	0.00	0.	0.00	16.	1.02	4.15	113	0.02	0.	0.02	23.
1.01	3.30	14	0.00	0.	0.00	16.	1.02	4.30	114	0.02	0.	0.02	22.
1.01	3.45	15	0.00	0.	0.00	16.	1.02	4.45	115	0.02	0.	0.02	22.
1.01	4.00	16	0.00	0.	0.00	16.	1.02	5.00	116	0.02	0.	0.02	22.
1.01	4.15	17	0.00	0.	0.00	16.	1.02	5.15	117	0.02	0.	0.02	21.
1.01	4.30	18	0.00	0.	0.00	16.	1.02	5.30	118	0.02	0.	0.02	21.
1.01	4.45	19	0.00	0.	0.00	16.	1.02	5.45	119	0.02	0.	0.02	21.
1.01	5.00	20	0.00	0.	0.00	16.	1.02	6.00	120	0.02	0.	0.02	20.
1.01	5.15	21	0.00	0.	0.00	16.	1.02	6.15	121	0.07	0.05	0.03	21.
1.01	5.30	22	0.00	0.	0.00	16.	1.02	6.30	122	0.07	0.05	0.03	22.
1.01	.45	23	0.00	0.	0.00	16.	1.02	6.45	123	0.07	0.05	0.03	26.
1.01	6.00	24	0.00	0.	0.00	16.	1.02	7.00	124	0.07	0.05	0.03	32.
1.01	6.15	25	0.00	0.	0.00	16.	1.02	7.15	125	0.07	0.05	0.03	40.
1.01	6.30	26	0.00	0.	0.00	16.	1.02	7.30	126	0.07	0.05	0.03	51.
1.01	6.45	27	0.00	0.	0.00	16.	1.02	7.45	127	0.07	0.05	0.03	65.
1.01	7.00	28	0.00	0.	0.00	16.	1.02	8.00	128	0.07	0.05	0.03	83.
1.01	7.15	29	0.00	0.	0.00	16.	1.02	8.15	129	0.07	0.05	0.03	103.
1.01	7.30	30	0.00	0.	0.00	16.	1.02	8.30	130	0.07	0.05	0.03	126.
1.01	7.45	31	0.00	0.	0.00	16.	1.02	8.45	131	0.07	0.05	0.03	153.
1.01	8.00	32	0.00	0.	0.00	16.	1.02	9.00	132	0.07	0.05	0.03	181.
1.01	8.15	33	0.00	0.	0.00	16.	1.02	9.15	133	0.07	0.05	0.03	212.
1.01	8.30	34	0.00	0.	0.00	16.	1.02	9.30	134	0.07	0.05	0.03	245.
1.01	8.45	35	0.00	0.	0.00	16.	1.02	9.45	135	0.07	0.05	0.03	279.
1.01	9.00	36	0.00	0.	0.00	16.	1.02	10.00	136	0.07	0.05	0.03	314.
1.01	9.15	37	0.00	0.	0.00	16.	1.02	10.15	137	0.07	0.05	0.03	349.
1.01	9.30	38	0.00	0.	0.00	16.	1.02	10.30	138	0.07	0.05	0.03	384.
1.01	9.45	39	0.00	0.	0.00	16.	1.02	10.45	139	0.07	0.05	0.03	418.
1.01	10.00	40	0.00	0.	0.00	16.	1.02	11.00	140	0.07	0.05	0.03	450.
1.01	10.15	41	0.00	0.	0.00	16.	1.02	11.15	141	0.07	0.05	0.03	481.
1.01	10.30	42	0.00	0.	0.00	16.	1.02	11.30	142	0.07	0.05	0.03	509.
1.01	10.45	43	0.00	0.	0.00	16.	1.02	11.45	143	0.07	0.05	0.03	536.
1.01	11.00	44	0.00	0.	0.00	16.	1.02	12.00	144	0.07	0.05	0.03	561.
1.01	11.15	45	0.00	0.	0.00	16.	1.02	12.15	145	0.39	0.37	0.02	589.
1.01	11.30	46	0.00	0.	0.00	16.	1.02	12.30	146	0.39	0.37	0.02	624.
1.01	11.45	47	0.00	0.	0.00	16.	1.02	12.45	147	0.39	0.37	0.02	672.
1.01	12.00	48	0.00	0.	0.00	16.	1.02	13.00	148	0.39	0.37	0.02	734.
1.01	12.15	49	0.03	0.	0.03	16.	1.02	13.15	149	0.47	0.44	0.02	815.
1.01	12.30	50	0.03	0.	0.03	16.	1.02	13.30	150	0.47	0.44	0.02	916.
1.01	12.45	51	0.03	0.	0.03	16.	1.02	13.45	151	0.47	0.44	0.02	1039.
1.01	13.00	52	0.03	0.	0.03	16.	1.02	14.00	152	0.47	0.44	0.02	1187.
1.01	13.15	53	0.03	0.	0.03	16.	1.02	14.15	153	0.59	0.56	0.02	1362.
1.01	13.30	54	0.03	0.	0.03	16.	1.02	14.30	154	0.59	0.56	0.02	1566.
1.01	13.45	55	0.03	0.	0.03	16.	1.02	14.45	155	0.59	0.56	0.02	1800.
1.01	14.00	56	0.03	0.	0.03	16.	1.02	15.00	156	0.59	0.56	0.02	2062.
1.01	14.15	57	0.04	0.	0.04	16.	1.02	15.15	157	0.59	0.57	0.02	2350.
1.01	14.30	58	0.04	0.	0.04	16.	1.02	15.30	158	1.19	1.16	0.03	2666.
1.01	14.45	59	0.04	0.	0.04	16.	1.02	15.45	159	3.33	3.30	0.03	3048.
1.01	15.00	60	0.04	0.	0.04	16.	1.02	16.00	160	0.83	0.81	0.02	3509.

1.01	15.45	63	0.23	0.	0.23	16.	1.02	16.45	163	0.55	0.52	0.02	5158.
1.01	16.00	64	0.06	0.	0.06	16.	1.02	17.00	164	0.55	0.52	0.02	5743.
1.01	16.15	65	0.04	0.	0.04	16.	1.02	17.15	165	0.43	0.40	0.02	6328.
1.01	16.30	66	0.04	0.01	0.03	16.	1.02	17.30	166	0.43	0.40	0.02	6907.
1.01	16.45	67	0.04	0.01	0.03	16.	1.02	17.45	167	0.43	0.40	0.02	7473.
1.01	17.00	68	0.04	0.01	0.03	17.	1.02	18.00	168	0.43	0.40	0.02	8017.
1.01	17.15	69	0.03	0.00	0.03	18.	1.02	18.15	169	0.04	0.01	0.03	8517.
1.01	17.30	70	0.03	0.00	0.03	20.	1.02	18.30	170	0.04	0.01	0.03	8949.
1.01	17.45	71	0.03	0.00	0.03	22.	1.02	18.45	171	0.04	0.01	0.03	9306.
1.01	18.00	72	0.03	0.00	0.03	24.	1.02	19.00	172	0.04	0.01	0.03	9584.
1.01	18.15	73	0.00	0.	0.00	27.	1.02	19.15	173	0.04	0.01	0.03	9780.
1.01	18.30	74	0.00	0.	0.00	30.	1.02	19.30	174	0.04	0.01	0.03	9892.
1.01	18.45	75	0.00	0.	0.00	33.	1.02	19.45	175	0.04	0.01	0.03	9920.
1.01	19.00	76	0.00	0.	0.00	36.	1.02	20.00	176	0.04	0.01	0.03	9857.
1.01	19.15	77	0.00	0.	0.00	39.	1.02	20.15	177	0.04	0.01	0.03	9692.
1.01	19.30	78	0.00	0.	0.00	42.	1.02	20.30	178	0.04	0.01	0.03	9427.
1.01	19.45	79	0.00	0.	0.00	44.	1.02	20.45	179	0.04	0.01	0.03	9103.
1.01	20.00	80	0.00	0.	0.00	47.	1.02	21.00	180	0.04	0.01	0.03	8753.
1.01	20.15	81	0.00	0.	0.00	48.	1.02	21.15	181	0.04	0.01	0.03	8384.
1.01	20.30	82	0.00	0.	0.00	50.	1.02	21.30	182	0.04	0.01	0.03	8001.
1.01	20.45	83	0.00	0.	0.00	51.	1.02	21.45	183	0.04	0.01	0.03	7610.
1.01	21.00	84	0.00	0.	0.00	51.	1.02	22.00	184	0.04	0.01	0.03	7217.
1.01	21.15	85	0.00	0.	0.00	51.	1.02	22.15	185	0.04	0.01	0.03	6826.
1.01	21.30	86	0.00	0.	0.00	50.	1.02	22.30	186	0.04	0.01	0.03	6442.
1.01	21.45	87	0.00	0.	0.00	49.	1.02	22.45	187	0.04	0.01	0.03	6069.
1.01	22.00	88	0.00	0.	0.00	48.	1.02	23.00	188	0.04	0.01	0.03	5716.
1.01	22.15	89	0.00	0.	0.00	46.	1.02	23.15	189	0.04	0.01	0.03	5385.
1.01	22.30	90	0.00	0.	0.00	45.	1.02	23.30	190	0.04	0.01	0.03	5073.
1.01	22.45	91	0.00	0.	0.00	43.	1.02	23.45	191	0.04	0.01	0.03	4780.
1.01	23.00	92	0.00	0.	0.00	41.	1.03	0.	192	0.04	0.01	0.03	4505.
1.01	23.15	93	0.00	0.	0.00	40.	1.03	0.15	193	0.	0.	0.	4246.
1.01	23.30	94	0.00	0.	0.00	38.	1.03	0.30	194	0.	0.	0.	4003.
1.01	23.45	95	0.00	0.	0.00	37.	1.03	0.45	195	0.	0.	0.	3774.
1.02	0.	96	0.00	0.	0.00	36.	1.03	1.00	196	0.	0.	0.	3558.
1.02	0.15	97	0.02	0.	0.02	34.	1.03	1.15	197	0.	0.	0.	3354.
1.02	0.30	98	0.02	0.	0.02	33.	1.03	1.30	198	0.	0.	0.	3163.
1.02	0.45	99	0.02	0.	0.02	32.	1.03	1.45	199	0.	0.	0.	2981.
1.02	1.00	100	0.02	0.	0.02	31.	1.03	2.00	200	0.	0.	0.	2810.
									SUM	19.99	16.41	3.58	298309.
										(508.)(	417.)(	91.)(	8447.17)

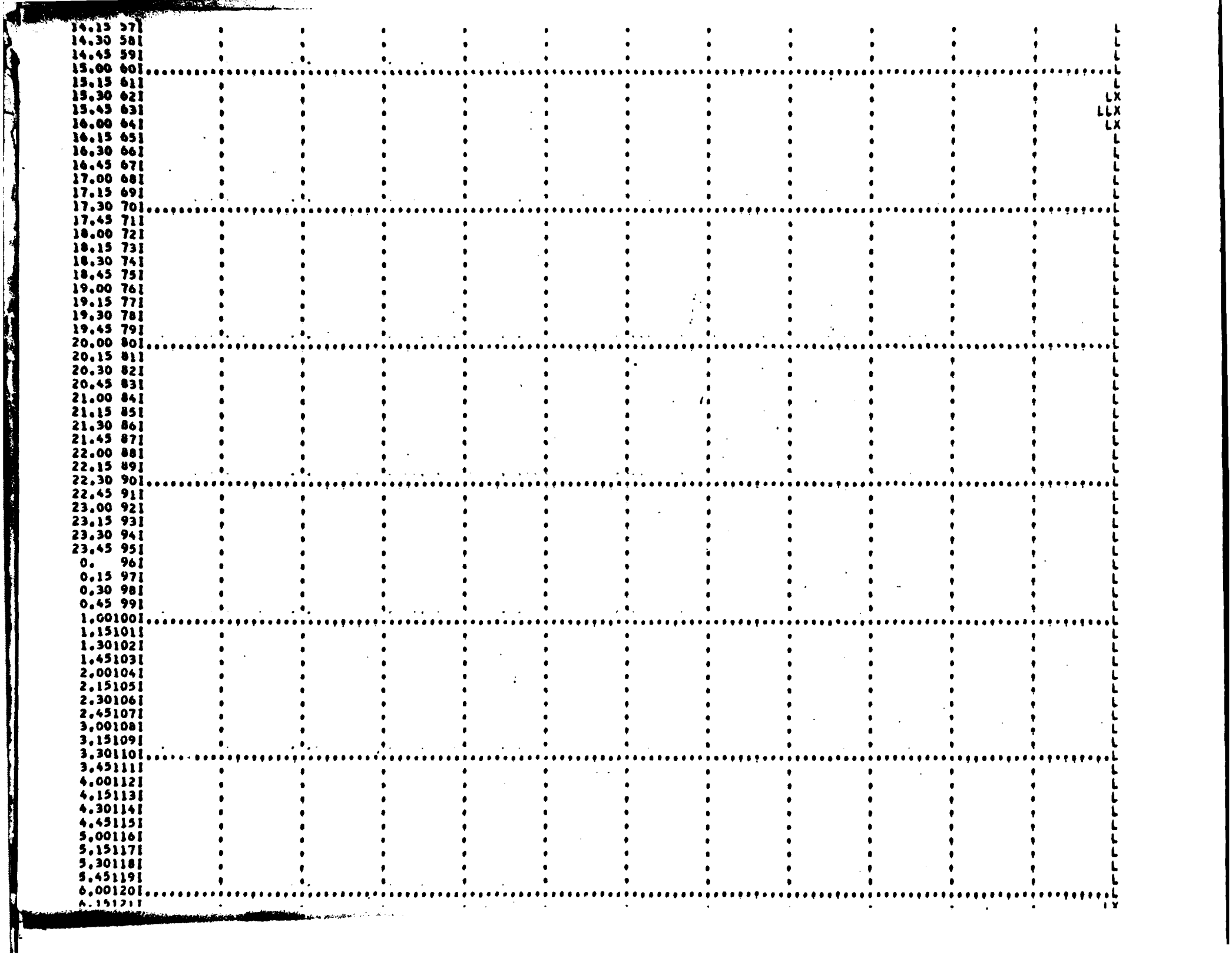
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	9920.	8241.	3067.	1485.	296901.
CMS	281.	233.	87.	42.	8407.
INCHES		9.57	14.25	14.37	14.37
MM		243.09	361.94	364.92	364.92
AC-FT		4086.	6084.	6134.	6134.
THOUS CU M		5041.	7505.	7567.	7567.

DVF

STATION 1

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)

	0.	2000.	4000.	6000.	8000.	10000.	0.	C.	0.	0.	C.	C.	0.
											PRECIP(L) AND EXCESS(X)		
	0.	0.	0.	0.	0.	0.	0.	C.	4.	3.	2.	1.	0.
0.15	11												L
0.30	21												L
0.45	31												L
1.00	41												L
1.15	51												L
1.30	61												L
1.45	71												L
2.00	81												L
2.15	91												L
2.30	101												L
2.45	111												L
3.00	121												L
3.15	131												L
3.30	141												L
3.45	151												L
4.00	161												L
4.15	171												L
4.30	181												L
4.45	191												L
5.00	201												L
5.15	211												L
5.30	221												L
5.45	231												L
6.00	241												L
6.15	251												L
6.30	261												L
6.45	271												L
7.00	281												L
7.15	291												L
7.30	301												L
7.45	311												L
8.00	321												L
8.15	331												L
8.30	341												L
8.45	351												L
9.00	361												L
9.15	371												L
9.30	381												L
9.45	391												L
10.00	401												L
10.15	411												L
10.30	421												L
10.45	431												L
11.00	441												L
11.15	451												L
11.30	461												L
11.45	471												L
12.00	481												L
12.15	491												L
12.30	501												L
12.45	511												L
13.00	521												L
13.15	531												L
13.30	541												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18.00 72
18.15 73
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18.45 75
19.00 76
19.15 77
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19.45 79
20.00 80
20.15 81
20.30 82
20.45 83
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21.15 85
21.30 86
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22.00 88
22.15 89
22.30 90
22.45 91
23.00 92
23.15 93
23.30 94
23.45 95
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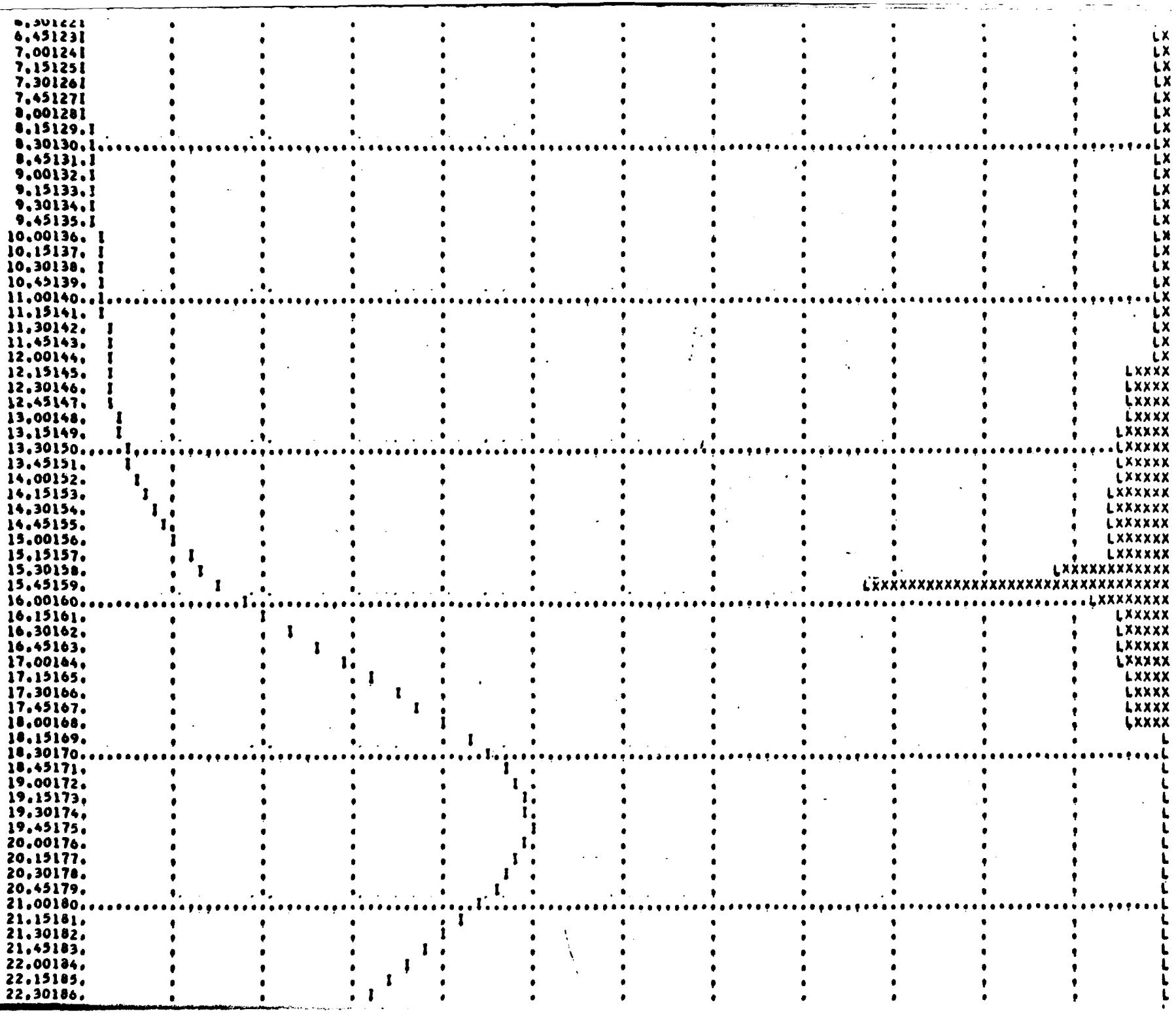

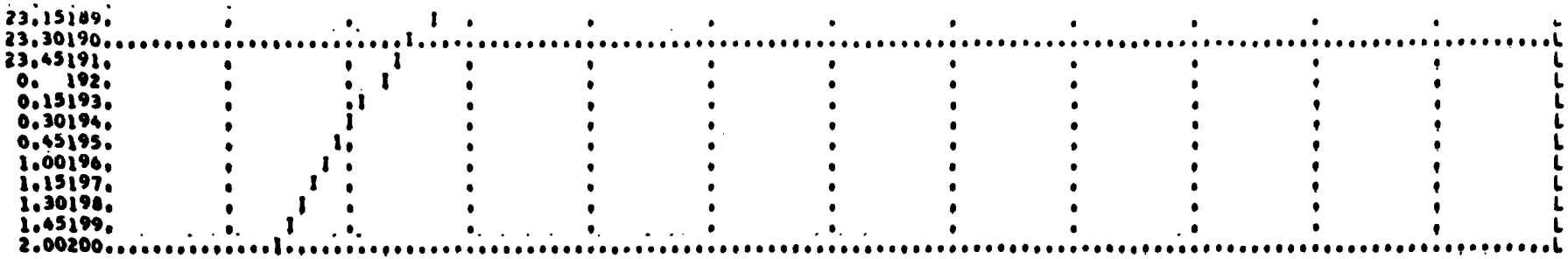
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1.45199.
2.00200.

DVN

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 1

8.	8.	8.	8.	8.	8.	8.	8.	8.	8.
8.	8.	8.	8.	8.	8.	8.	8.	8.	8.
8.	8.	8.	8.	8.	8.	8.	8.	8.	8.
8.	8.	8.	8.	8.	8.	8.	8.	8.	8.
8.	8.	8.	8.	8.	8.	8.	8.	8.	8.
8.	8.	8.	8.	8.	8.	8.	8.	8.	8.
8.	8.	8.	8.	8.	8.	8.	9.	9.	10.
11.	12.	14.	15.	16.	18.	20.	21.	22.	23.
24.	25.	25.	26.	26.	25.	25.	24.	23.	22.
21.	21.	20.	19.	18.	18.	17.	17.	16.	16.
15.	15.	14.	14.	14.	13.	13.	13.	12.	12.
12.	12.	11.	11.	11.	11.	11.	11.	10.	10.
10.	11.	13.	16.	20.	26.	33.	41.	51.	63.
76.	91.	106.	122.	139.	157.	174.	192.	209.	225.
240.	255.	268.	281.	294.	312.	336.	367.	407.	458.
520.	594.	681.	783.	900.	1031.	1175.	1334.	1514.	1754.
2013.	2291.	2579.	2872.	3164.	3453.	3736.	4009.	4298.	4475.
4653.	4792.	4890.	4946.	4960.	4929.	4846.	4714.	4552.	4376.
4192.	4001.	3805.	3609.	3413.	3221.	3035.	2858.	2692.	2536.
2390.	2252.	2123.	2001.	1887.	1779.	1677.	1581.	1491.	1405.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4960.	4121.	1534.	742.	148450.
CMS	140.	117.	43.	21.	4204.
INCHES		4.79	7.12	7.18	7.18
MM		121.55	180.97	182.46	182.46
AC-FT		2043.	3042.	3067.	3067.
THOUS CU M		2520.	3752.	3783.	3783.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 2

16.	16.	16.	16.	16.	16.	16.	16.	16.	16.
16.	16.	16.	16.	16.	16.	16.	16.	16.	16.
16.	16.	16.	16.	16.	16.	16.	16.	16.	16.
16.	16.	16.	16.	16.	16.	16.	16.	16.	16.
16.	16.	16.	16.	16.	16.	16.	16.	16.	16.
16.	16.	16.	16.	16.	16.	16.	16.	16.	16.
16.	16.	16.	16.	16.	16.	16.	17.	18.	20.
22.	24.	27.	30.	33.	36.	39.	42.	44.	47.
48.	50.	51.	51.	51.	50.	49.	48.	46.	45.
43.	41.	40.	38.	37.	36.	34.	33.	32.	31.
30.	30.	29.	28.	27.	27.	26.	25.	25.	24.
24.	23.	23.	22.	22.	22.	21.	21.	21.	20.
21.	22.	26.	32.	40.	51.	65.	83.	103.	126.
153.	181.	212.	245.	279.	314.	349.	384.	418.	450.
481.	509.	536.	561.	589.	624.	672.	734.	815.	916.
1039.	1187.	1362.	1566.	1800.	2062.	2350.	2668.	3018.	3509.
4027.	4582.	5158.	5743.	6328.	6907.	7473.	8017.	8517.	8949.
9306.	9584.	9780.	9892.	9920.	9857.	9692.	9427.	9103.	8753.
8384.	6001.	7610.	7217.	6826.	6442.	6069.	5716.	5385.	5073.
4780.	4505.	4246.	4003.	3774.	3558.	3354.	3163.	2981.	2810.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	9920.	8241.	3067.	1485.	296901.
CMS	281.	233.	87.	42.	8407.
INCHES		9.57	14.25	14.37	14.37
MM		243.09	361.94	364.92	364.92
AC-FT					

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTE THROUGH RESERVOIR

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	1	0	0	2	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.	0.	0.	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.	0.	0.	-1510.	-1

STAGE	1510.00	1512.00	1514.00	1516.00	1518.00	1520.00
FLOW	0.	1190.00	3696.00	7201.00	11087.00	15495.00
CAPACITY=	0.	115.	340.	505.	855.	1550.
ELEVATION=	1500.	1504.	1508.	1510.	1514.	1520.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
1510.0	0.	0.	0.	0.	0.	0.	0.

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1514.0	3.0	1.5	200.

STATION 1, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

1.	2.	3.	3.	4.	5.	5.	5.	6.	6.
6.	7.	7.	7.	7.	7.	7.	7.	7.	8.
8.	8.	8.	8.	8.	8.	8.	8.	8.	8.
8.	8.	8.	8.	8.	8.	8.	8.	8.	8.
8.	8.	8.	8.	8.	8.	8.	8.	8.	8.
8.	8.	8.	8.	8.	8.	8.	0.	8.	8.
8.	8.	8.	8.	8.	8.	8.	8.	8.	8.
9.	9.	10.	10.	11.	12.	13.	14.	15.	16.
17.	18.	19.	20.	20.	21.	22.	22.	22.	22.
22.	22.	22.	21.	21.	21.	20.	20.	19.	19.
19.	18.	18.	17.	17.	16.	16.	15.	15.	15.
14.	14.	14.	13.	13.	13.	13.	12.	12.	12.
12.	11.	12.	12.	13.	14.	16.	19.	22.	27.
33.	39.	47.	56.	66.	77.	88.	101.	114.	127.
141.	155.	169.	183.	197.	211.	225.	242.	261.	284.
311.	343.	381.	427.	482.	545.	619.	702.	797.	908.
1036.	1183.	1498.	1814.	2125.	2430.	2730.	3025.	3310.	3583.
3855.	4128.	4363.	4551.	4690.	4779.	4817.	4804.	4744.	4646.
4522.	4378.	4220.	4053.	3883.	3715.	3563.	3404.	3252.	3080.
2921.	2760.	2617.	2474.	2338.	2207.	2084.	1967.	1856.	1751.

STORAGE

505.	505.	505.	506.	506.	506.	506.	506.	506.	506.
506.	506.	506.	506.	506.	506.	506.	506.	506.	506.
506.	506.	506.	506.	506.	506.	506.	506.	506.	506.
506.	506.	506.	506.	506.	506.	506.	506.	506.	506.
506.	506.	506.	506.	506.	506.	506.	506.	506.	506.

506.	506.	506.	506.	506.	506.	506.			
506.	506.	506.	506.	507.	507.	507.	507.	507.	507.
507.	508.	508.	508.	508.	508.	508.	508.	508.	508.
508.	508.	508.	508.	508.	508.	508.	508.	508.	508.
508.	508.	508.	508.	507.	507.	507.	507.	507.	507.
507.	507.	507.	507.	507.	507.	507.	507.	507.	507.
507.	507.	507.	507.	507.	507.	507.	508.	508.	509.
510.	511.	512.	513.	515.	516.	518.	520.	522.	524.
526.	528.	530.	532.	534.	536.	538.	541.	543.	547.
551.	555.	561.	568.	576.	585.	596.	608.	622.	639.
657.	679.	702.	724.	745.	767.	788.	808.	828.	847.
865.	880.	892.	901.	908.	913.	915.	914.	911.	906.
900.	893.	885.	876.	866.	856.	846.	835.	823.	812.
801.	790.	780.	770.	760.	751.	742.	734.	726.	719.

STAGE

1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0
1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0
1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0
1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0
1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0
1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0
1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0
1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0
1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0
1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0
1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0
1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0
1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0
1510.1	1510.1	1510.1	1510.1	1510.1	1510.1	1510.1	1510.2	1510.2	1510.2
1510.2	1510.3	1510.3	1510.3	1510.3	1510.4	1510.4	1510.4	1510.4	1510.5
1510.5	1510.6	1510.6	1510.7	1510.8	1510.9	1511.0	1511.2	1511.3	1511.5
1511.7	1512.0	1512.2	1512.5	1512.7	1513.0	1513.2	1513.5	1513.7	1513.9
1514.1	1514.2	1514.3	1514.4	1514.5	1514.5	1514.5	1514.5	1514.5	1514.4
1514.4	1514.3	1514.3	1514.2	1514.1	1514.0	1513.9	1513.8	1513.6	1513.5
1513.4	1513.3	1513.1	1513.0	1512.9	1512.8	1512.7	1512.6	1512.5	1512.4

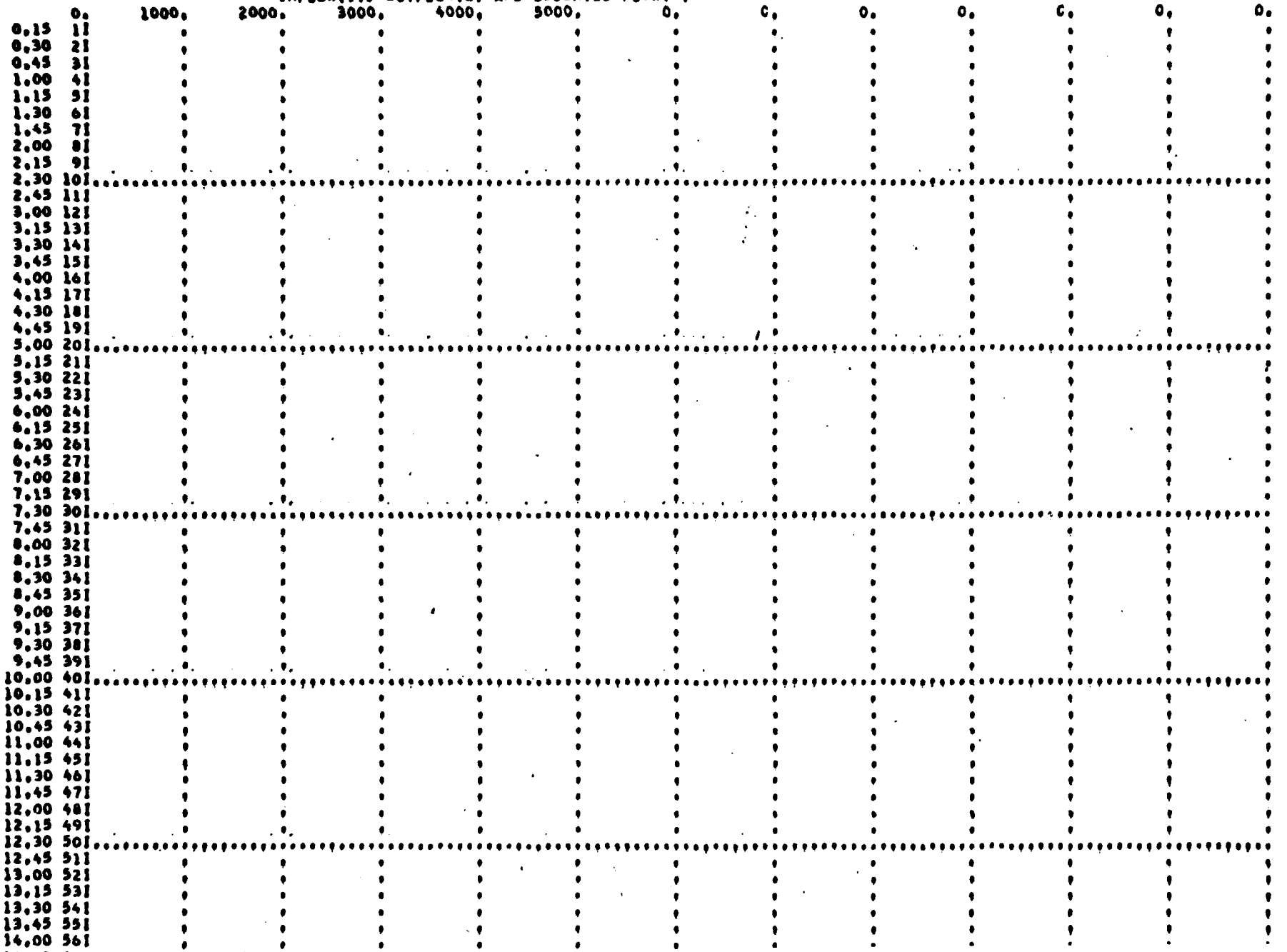
PEAK OUTFLOW IS 4817. AT TIME 44.25 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4817.	4007.	1427.	690.	138093.
CMS	136.	113.	40.	20.	3910.
INCHES		4.65	6.63	6.68	6.68
MM		118.21	168.38	169.73	169.73
AC-FT		1987.	2830.	2853.	2853.
THOUS CU M		2451.	3491.	3519.	3519.

OVF

STATION 1

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)



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14.45 59|
15.00 60|
15.15 61|
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16.45 67|
17.00 68|
17.15 69|
17.30 70|
17.45 71|
18.00 72|
18.15 73|
18.30 74|
18.45 75|
19.00 76|
19.15 77|
19.30 78|
19.45 79|
20.00 80|
20.15 81|
20.30 82|
20.45 83|
21.00 84|
21.15 85|
21.30 86|
21.45 87|
22.00 88|
22.15 89|
22.30 90|
22.45 91|
23.00 92|
23.15 93|
23.30 94|
23.45 95|
 0.   96|
 0.15 97|
 0.30 98|
 0.45 99|
 1.00100|
 1.15101|
 1.30102|
 1.45103|
 2.00104|
 2.15105|
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 6.00120|
 6.15121|
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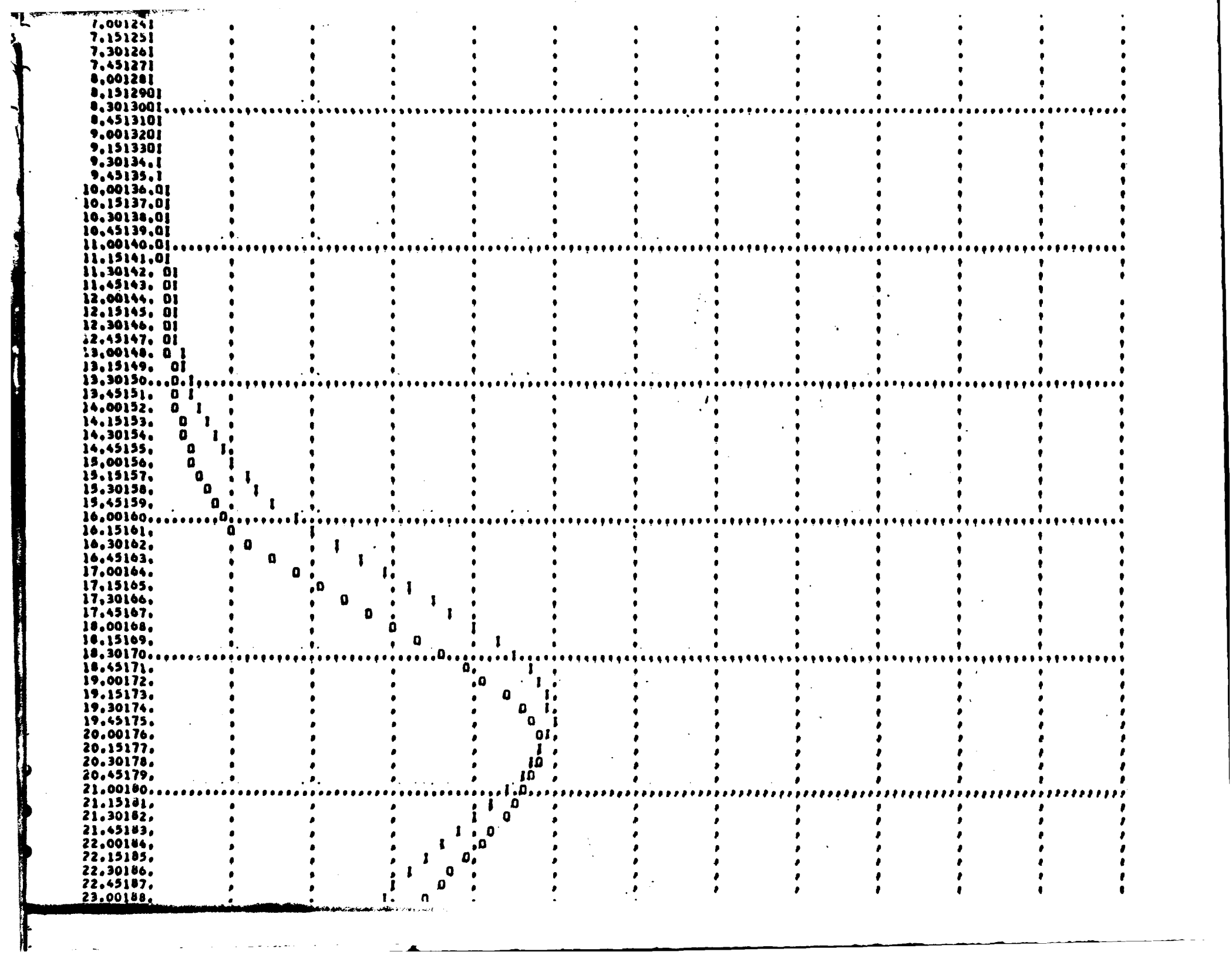

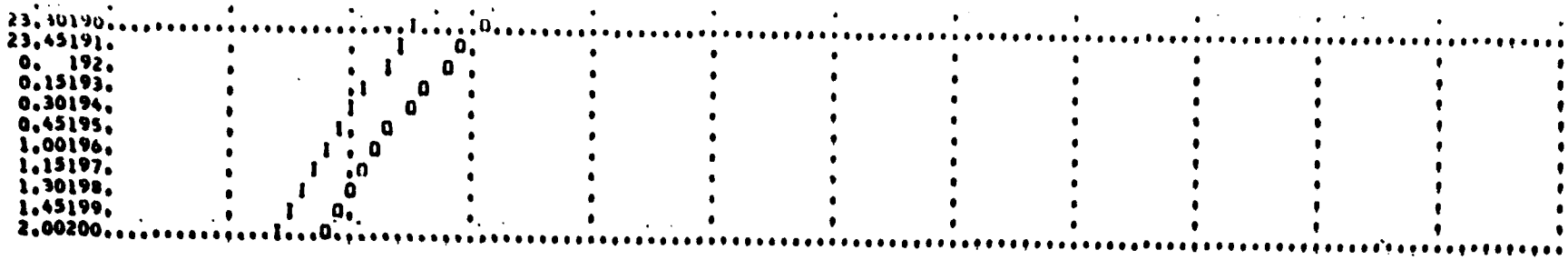
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23.45191.
0. 192.
0.15193.
0.30194.
0.45195.
1.00196.
1.15197.
1.30198.
1.45199.
2.00200

OVN

STATION 1, PLAN 1, RATIO 2

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

2.	4.	6.	7.	8.	9.	10.	11.	12.	12.
13.	13.	13.	14.	14.	14.	15.	15.	15.	15.
15.	15.	15.	15.	16.	16.	16.	16.	16.	16.
16.	16.	16.	16.	16.	16.	16.	16.	16.	16.
16.	16.	16.	16.	16.	16.	16.	16.	16.	16.
16.	16.	16.	16.	16.	16.	16.	16.	16.	16.
16.	16.	16.	16.	16.	16.	16.	16.	16.	17.
17.	18.	19.	20.	22.	23.	25.	27.	29.	31.
34.	36.	38.	39.	41.	42.	43.	44.	44.	44.
44.	44.	44.	43.	42.	41.	41.	40.	39.	38.
37.	36.	35.	34.	33.	33.	32.	31.	30.	29.
29.	28.	27.	27.	26.	26.	25.	25.	24.	24.
23.	23.	23.	24.	25.	28.	32.	38.	45.	54.
65.	79.	94.	112.	131.	153.	176.	201.	228.	255.
282.	310.	338.	366.	393.	421.	451.	484.	522.	567.
621.	686.	763.	855.	964.	1091.	1282.	1599.	1963.	2273.
2658.	3082.	3543.	4097.	4751.	5423.	6088.	6733.	7346.	7913.
8418.	8851.	9220.	9498.	9683.	9776.	9776.	9678.	9491.	9237.
8938.	8620.	8279.	7920.	7552.	7180.	6811.	6450.	6102.	5770.
5455.	5158.	4878.	4614.	4367.	4135.	3920.	3722.	3572.	3383.

STORAGE

505.	506.	506.	506.	506.	506.	506.	507.	507.	507.
507.	507.	507.	507.	507.	507.	507.	507.	507.	507.
507.	507.	507.	507.	507.	507.	507.	507.	507.	507.
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510.	510.	511.	511.	511.	511.	511.	511.	512.	512.
512.	511.	511.	511.	511.	511.	511.	511.	511.	511.
510.	510.	510.	510.	510.	510.	510.	510.	509.	509.
509.	509.	509.	509.	509.	509.	509.	509.	509.	508.
508.	508.	508.	509.	509.	509.	510.	511.	512.	513.
515.	517.	519.	521.	524.	528.	531.	535.	538.	542.
547.	551.	555.	559.	563.	567.	571.	576.	582.	588.
596.	606.	617.	631.	647.	665.	686.	709.	731.	756.
783.	812.	844.	878.	911.	943.	973.	1000.	1045.	1048.
1068.	1085.	1098.	1108.	1115.	1118.	1118.	1114.	1108.	1099.
1088.	1076.	1063.	1049.	1034.	1019.	1003.	988.	973.	959.
944.	931.	917.	905.	892.	880.	868.	857.	845.	833.

STAGE

1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0
1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0
1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0
1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0
1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0
1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0
1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0
1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.1
1510.1	1510.1	1510.1	1510.1	1510.1	1510.1	1510.1	1510.1	1510.1	1510.1
1510.1	1510.1	1510.1	1510.1	1510.1	1510.1	1510.1	1510.1	1510.1	1510.1
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1510.0	1510.0	1510.0	1510.0	1510.0	1510.0	1510.1	1510.1	1510.1	1510.1
1510.1	1510.1	1510.2	1510.2	1510.2	1510.3	1510.3	1510.3	1510.4	1510.4
1510.5	1510.5	1510.6	1510.6	1510.7	1510.7	1510.8	1510.8	1510.9	1511.0
1511.0	1511.2	1511.3	1511.4	1511.6	1511.8	1512.1	1512.3	1512.6	1512.9
1513.2	1513.5	1513.9	1514.2	1514.5	1514.8	1515.0	1515.3	1515.5	1515.7
1515.8	1516.0	1516.1	1516.2	1516.2	1516.3	1516.3	1516.2	1516.2	1516.1
1516.0	1515.9	1515.8	1515.7	1515.5	1515.4	1515.3	1515.1	1515.0	1514.9
1514.8	1514.7	1514.5	1514.4	1514.3	1514.2	1514.1	1514.0	1513.9	1513.8

PEAK OUTFLOW IS 9776. AT TIME 44.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	9776.	8131.	2905.	1405.	281035.
CMS	277.	230.	82.	40.	7958.
INCHES		9.44	13.49	13.60	13.60
MM		239.86	342.72	345.42	345.42
AC-FT		4032.	5761.	5807.	5807.
THOUS CU M		4974.	7106.	7162.	7162.

OVF

STATION 1

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)

```
      0.    2000.    4000.    6000.    8000.   10000.      0.      0.      0.      0.      0.      0.
 0.15  1I
 0.30  2I
 0.45  3I
 1.00  4I
 1.15  5I
 1.30  6I
 1.45  7I
 2.00  8I
 2.15  9I
 2.30 10I.....................................................................................
 2.45 11I
 3.00 12I
 3.15 13I
 3.30 14I
 3.45 15I
 4.00 16I
 4.15 17I
 4.30 18I
 4.45 19I
 5.00 20I.....................................................................................
 5.15 21I
 5.30 22I
 5.45 23I
 6.00 24I
 6.15 25I
 6.30 26I
 6.45 27I
 7.00 28I
 7.15 29I
 7.30 30I.....................................................................................
 7.45 31I
 8.00 32I
 8.15 33I
 8.30 34I
 8.45 35I
 9.00 36I
 9.15 37I
 9.30 38I
 9.45 39I
10.00 40I.....................................................................................
10.15 41I
10.30 42I
10.45 43I
11.00 44I
11.15 45I
11.30 46I
11.45 47I
12.00 48I
12.15 49I
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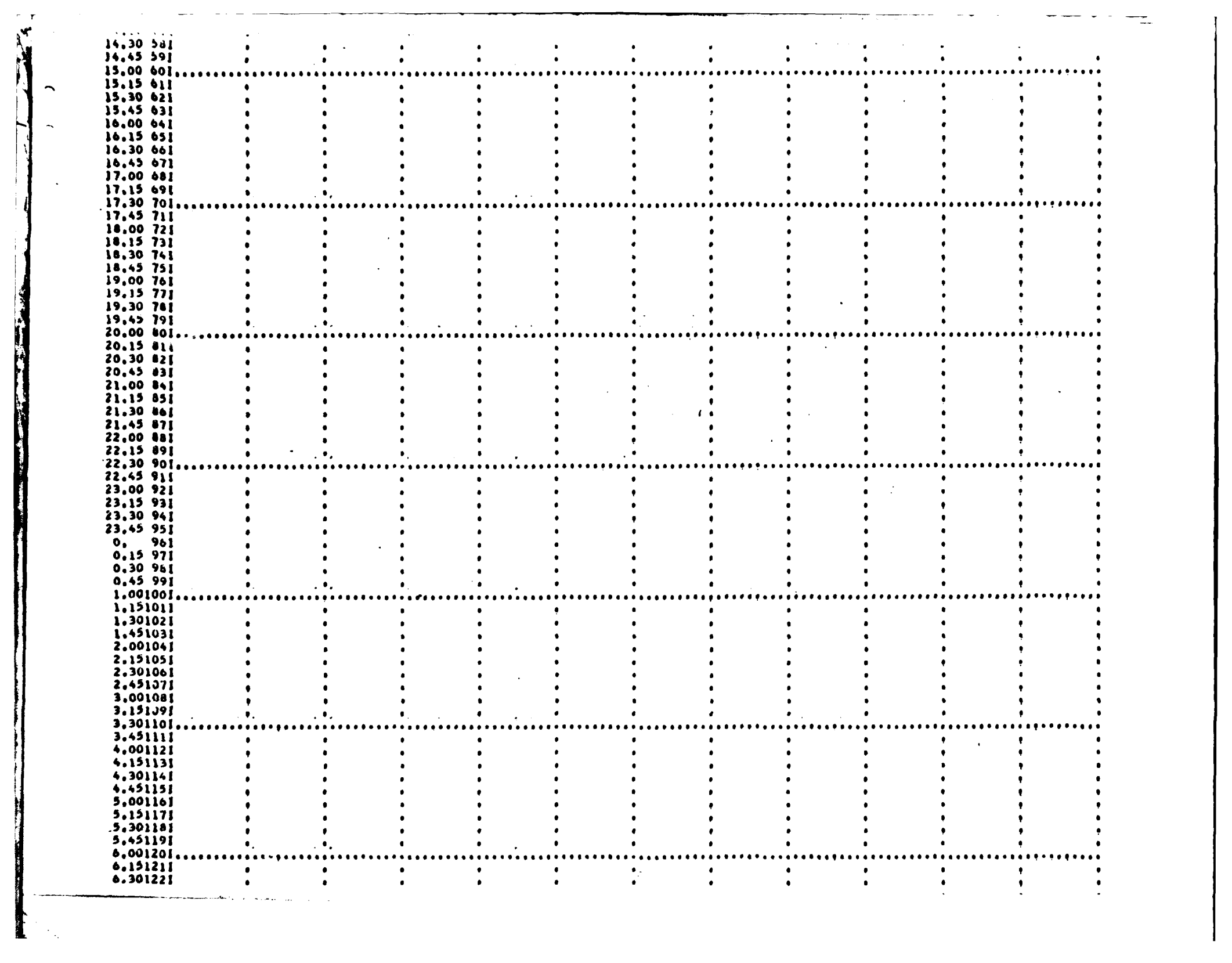
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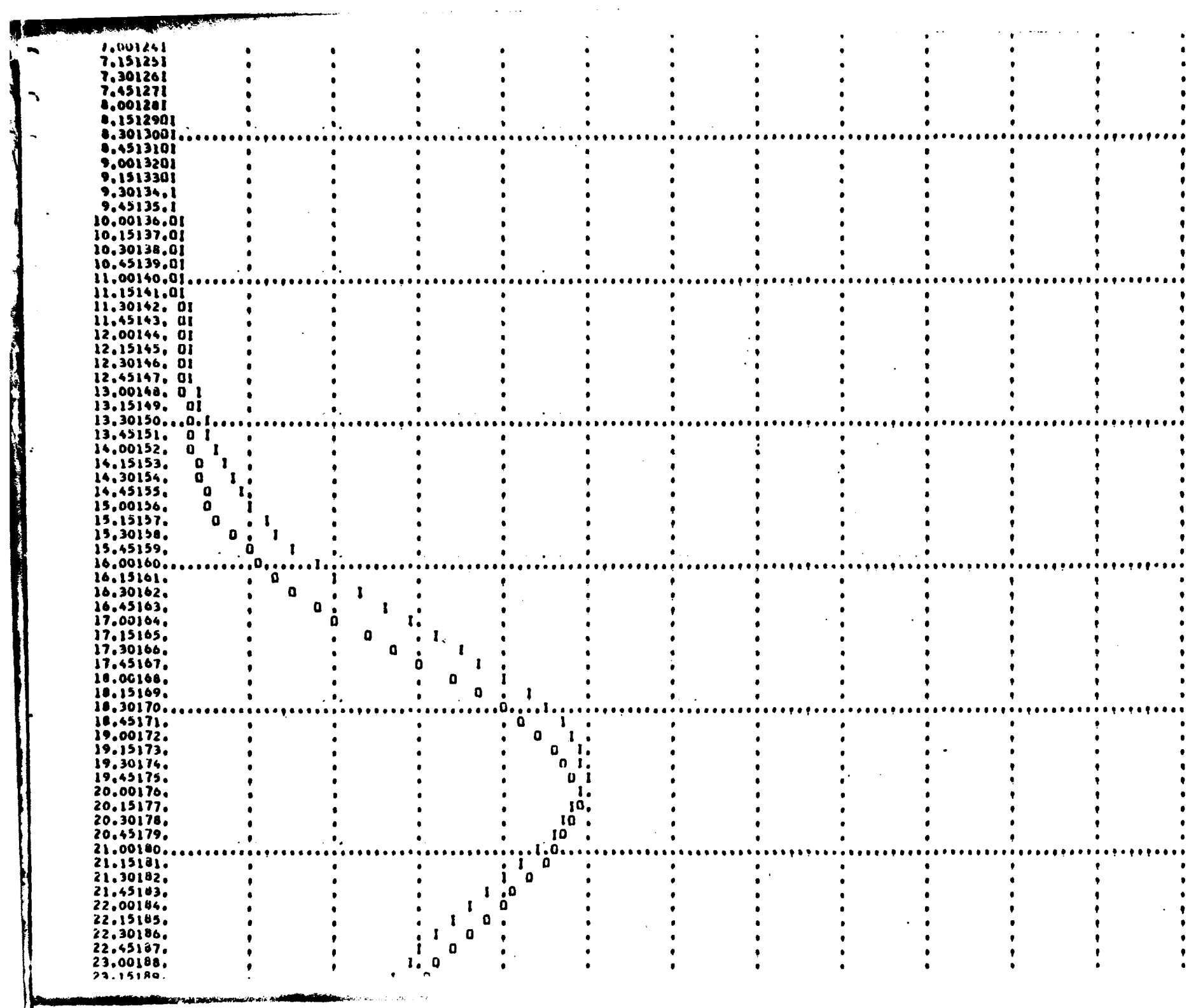

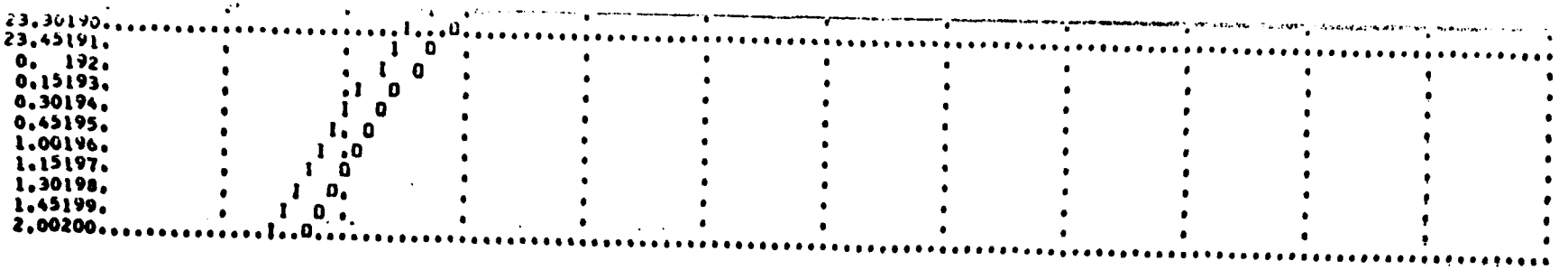
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0.15193.
0.30194.
0.45195.
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1.15197.
1.30198.
1.45199.
2.00200.

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FORMULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIO 1	RATIO 2	RATIOS APPLIED TO FLOWS
				0.50	1.00	
HYDROGRAPH AT	1	8.01	1	4960.	9920.	
	(	0.00)	(	140.45)(	280.90)(	
ROUTED TO	1	8.01	1	4817.	9776.	
	(	0.00)	(	136.41)(	276.83)(	

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1510.00	1510.00	1514.00
STORAGE	505.	505.	855.
OUTFLOW	0.	0.	3696.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1514.51	0.51	915.	4817.	4.00	44.25	0.
1.00	1516.27	2.27	1118.	9776.	8.75	44.00	0.

APPENDIX D

REFERENCES

APPENDIX D

REFERENCES

1) U.S. Department of Commerce, Technical Paper No. 40, Rainfall Frequency Atlas of the United States, May 1961.

2) Soil Conservation Service, National Engineering Handbook, Section 4, Hydrology, August 1972 (U.S. Department of Agriculture).

3) H.W. King and E.F. Brater, Handbook of Hydraulics, 5th edition, McGraw-Hill, 1963.

4) T.W. Lambe and R.V. Whitman, Soil Mechanics, John Wiley and Sons, 1965.

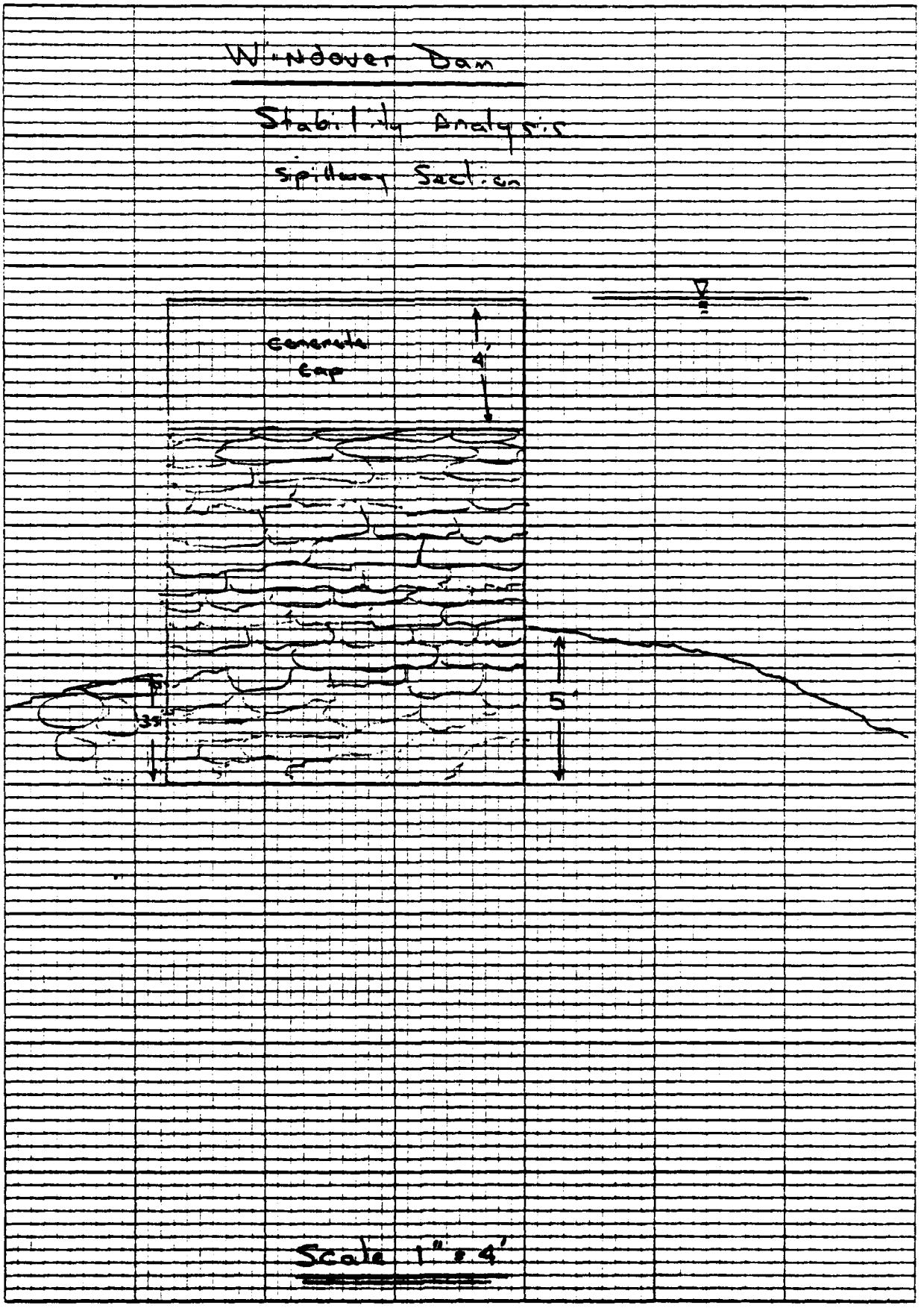
5) W.D. Thornbury, Principles of Geomorphology, John Wiley and Sons, 1969.

6) University of the State of New York, Geology of New York, Education Leaflet 20, Reprinted 1973.

7) Cornell University Agriculture Experiment Station (compiled by M.G. Cline and R.L. Marshall), General Soil Map of New York State and Soils of New York Landscapes, Information Bulletin 119, 1977.

APPENDIX E

STABILITY ANALYSIS



Area of Dam Spillway Section

11 x 15 = 165 ft² moment arm = 5.5'

Seismic Zone 3 α = .10

Active Soil Pressure = 5' height
Passive Soil Pressure = 3.5' height

Assume Ice Loading = 7.5 kips / L.F. at top of Spillway

½ PMF = 4.4 ft. over top of spillway
PMF = 6.3 ft. over top of Spillway

Case I Normal Conditions
Case II Ice Loading
Case III ½ PMF
Case IV PMF
Case V Seismic Loading

INPUT FOR STABILITY ANALYSIS PROGRAM

Input Location	Input Parameter Description
0	Unit Weight of Dam (K/ft.^{3})
1	Area of Segment #1 (ft.^{2})
2	Location of Center of Gravity from toe (ft.) Segment #1
3	Area of Segment #2 (ft.^{2})
4	Location of CG from toe, Seg. #2 (ft.)
5	Area of Segment #3 (ft.^{2})
6	Location of CG from toe, Sg. #3 (ft.)
7	Total Base Width of Dam (ft.)
8	Height of Dam (ft.)
9	Ice Loading (K/L.F.)
10	Coefficient of Sliding
11	Unit Weight of Soil (K/ft.^{3})
12	Coefficient of Active Soil Pressure - Ka
13	Coefficient of Passive Soil Pressure - Kp
14	Height of Water over Top of Dam (ft.)
15	Height of Soil for Active Pressure (ft.)
16	Height of Soil for Passive Pressure (ft.)
17	Height of Water in Tailrace Channel (ft.)
18	Unit Weight of Water (K/ft.^{3})
19	Area of Segment #4 (ft.^{2})
20	Location of CG from toe, Seg. #4 (ft.)
46	Height of Ice Load or Active Water
49	Location of Foundation Drains from Heel (ft.)
50	Seismic Coefficient (α)

Stability Analysis

Input Parameters

Input Location	Case I	Case II	Case III	Case IV	Case V
00	.16				
01	165				
02	5.5				
03	0				
04	0				
05	0				
06	0				
07	11				
08	15				
09	0	7.5	0	0	0
10	.7				
11	.08				
12	.3				
13	3				
14	0	0	4.4	6.3	0
15	5				
16	35				
17	0	0	2	3	0
18	.0629				
19	0				
20	0				
46	15	5	19.4	21.3	15
50	0	0	0	0	.10

WINDOVER DAM
STABILITY ANALYSIS
SPILLWAY SECTION

Case I Normal Loading

(a) 2.002876541
(b) 3.461462451
(c) 2.233114754

Case II Ice Loading

(a) .7904945871
(b) -1.832156973
(c) 1.102995951

Case III 1/2 PMF

(a) 1.127555209
(b) .8085949352
(c) .9894738093

Case IV PMF

(a) .9373806748
(b) -.4862449561
(c) .7815711612

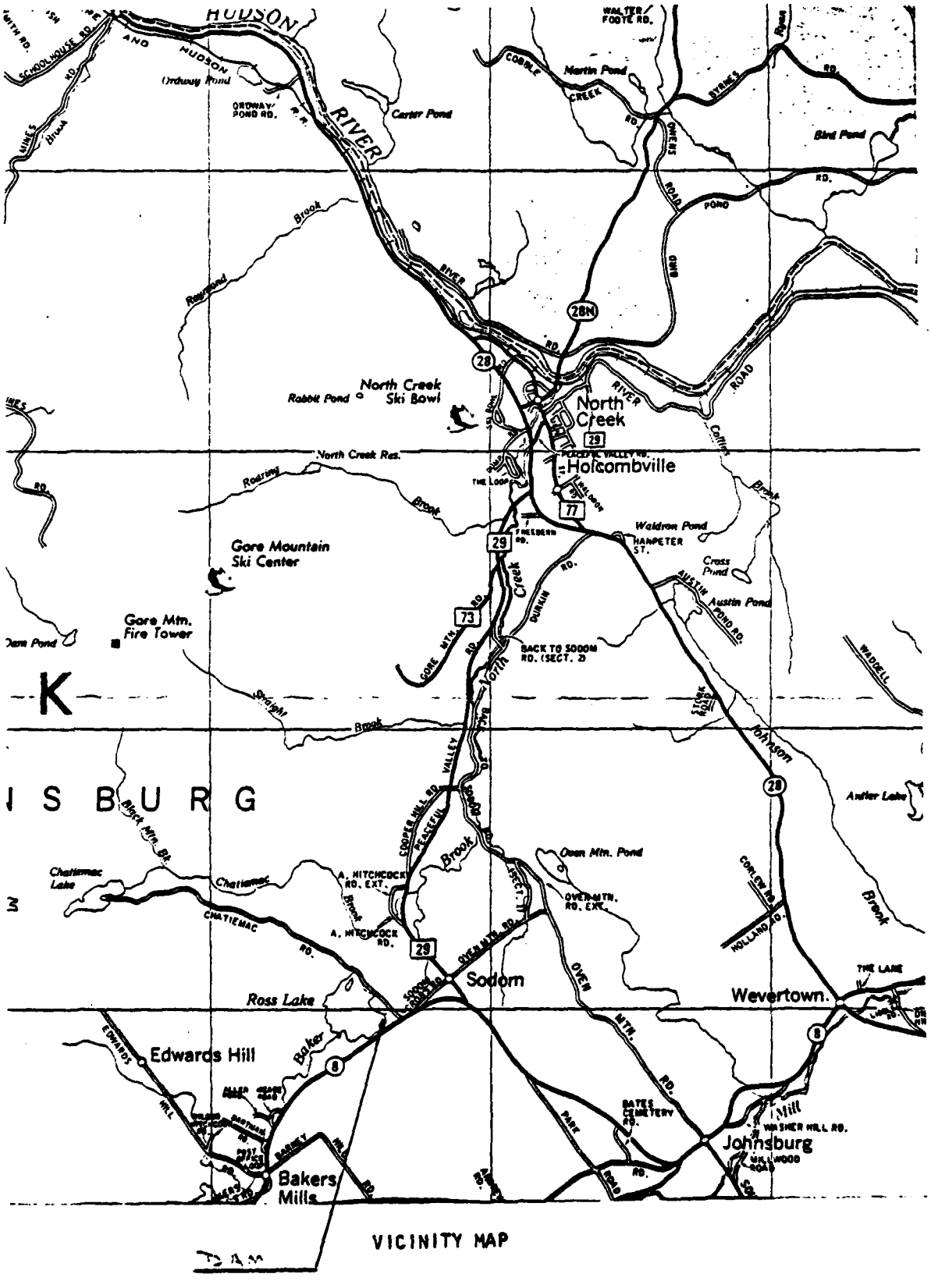
Case V Seismic Loading

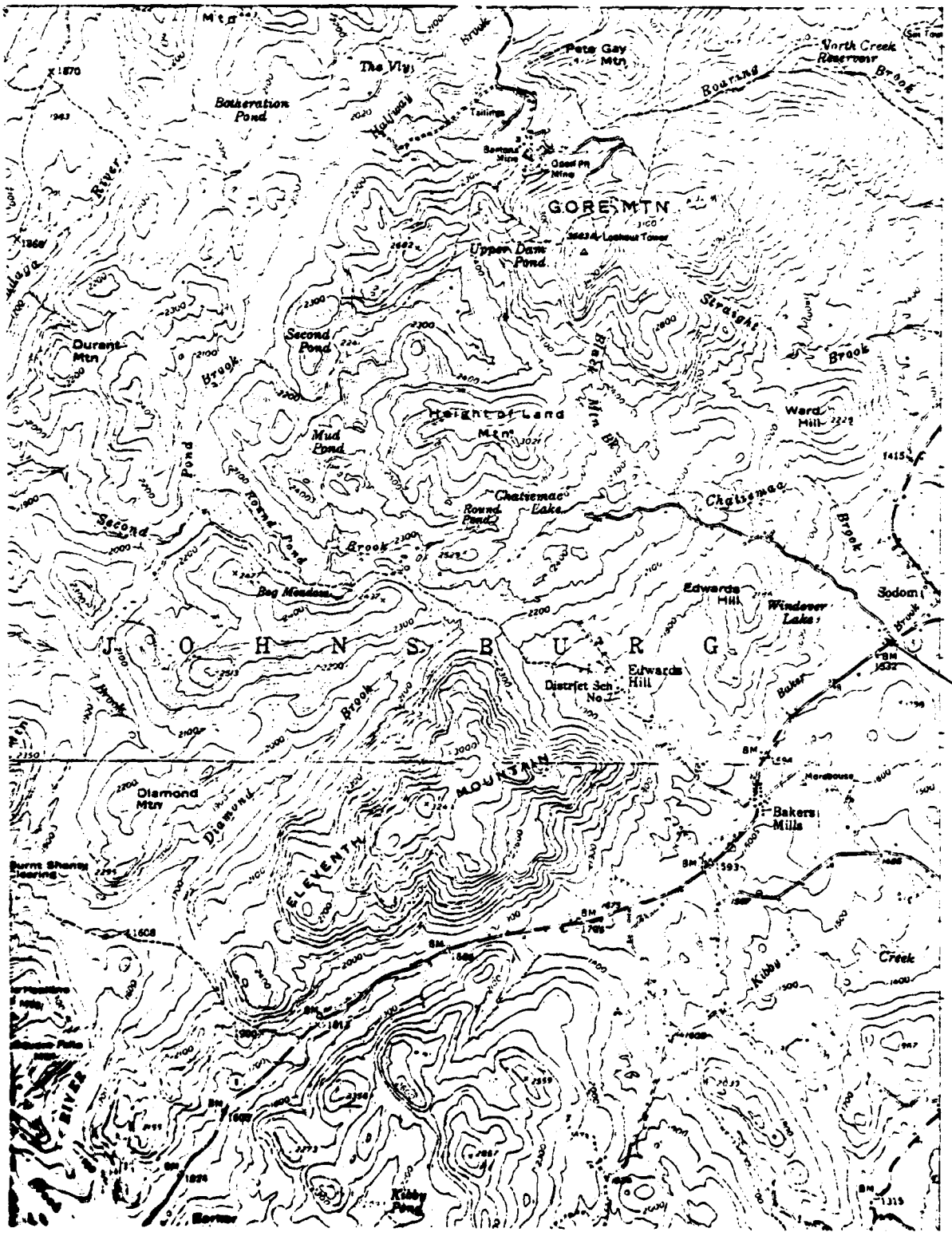
(a) 1.587532282
(b) 2.558441558
(c) 1.522223774

NOTE: (a) is the factor of safety for overturning;
(b) is the location of the resultant from the toe;
(c) is the factor of safety of safety for sliding.

APPENDIX F

DRAWINGS


HUDSON
RIVER
North Creek
Ski Bowl
Rabbit Pond
North Creek
Hofcombville
Gore Mountain
Ski Center
Gore Mtn.
Fire Tower
Sodom
Ross Lake
Edwards Hill
Bakers
Mills
Wevertown.
Johnsburg
Chatiemac
Lake
Crane Pond
Martin Pond
Bird Pond
Carter Pond
Waldron Pond
Cross
Pond
Austin Pond
Ocean Mtn. Pond
Antler Lake
28N
28
29
77
73
8
VICINITY MAP



TOPOGRAPHIC MAP

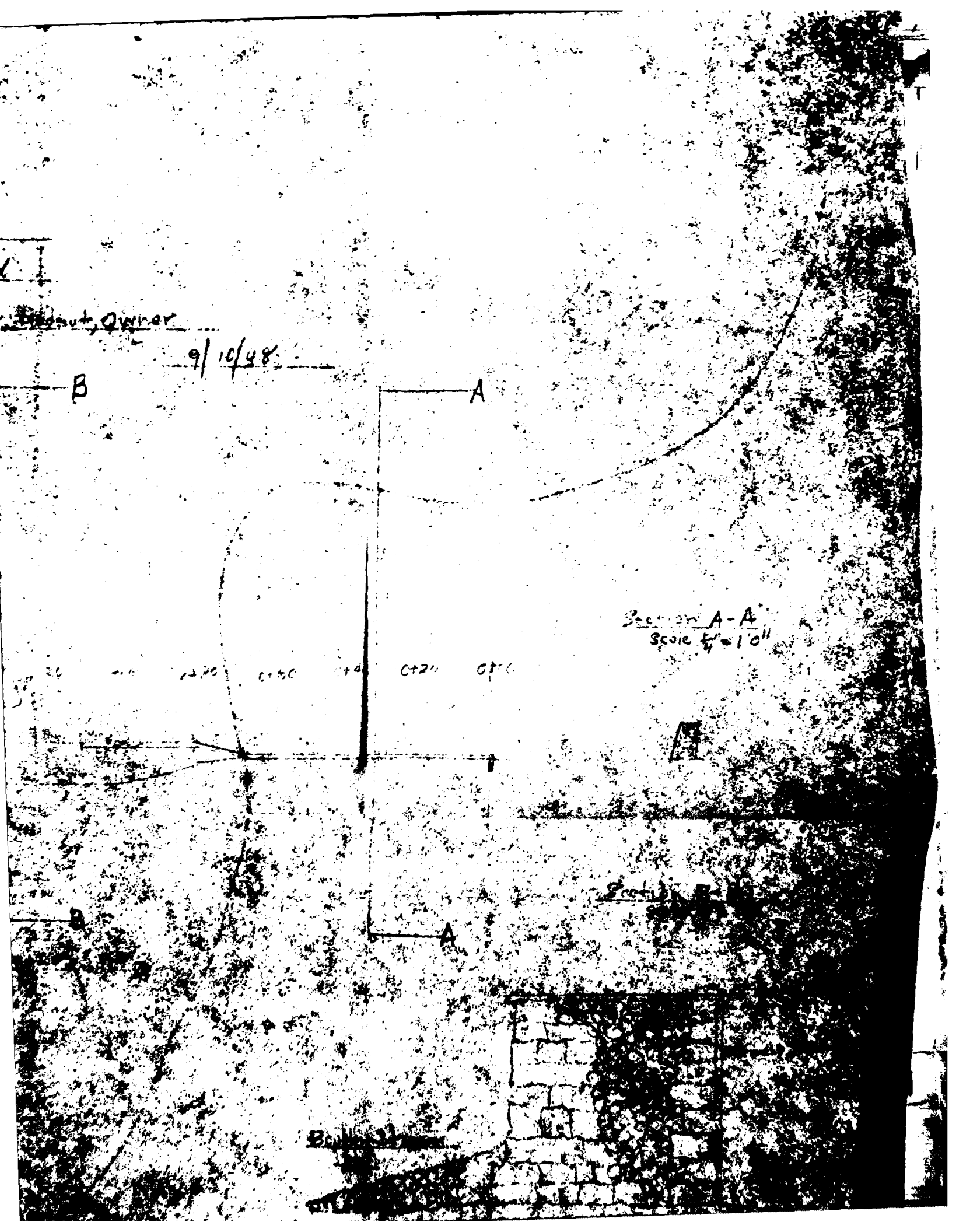
WINDOVER DAM

LIST OF DRAWINGS

Plan & Sections Existing Conditions (1948)	Sheet I of III
Plan - Proposed Construction	Sheet II of III
Sections of Earth Embankment - Proposed	Sheet III of III

Plans Dated September 10, 1948


Old Ross Dam
Bakers Mills N.Y.
Old Spillway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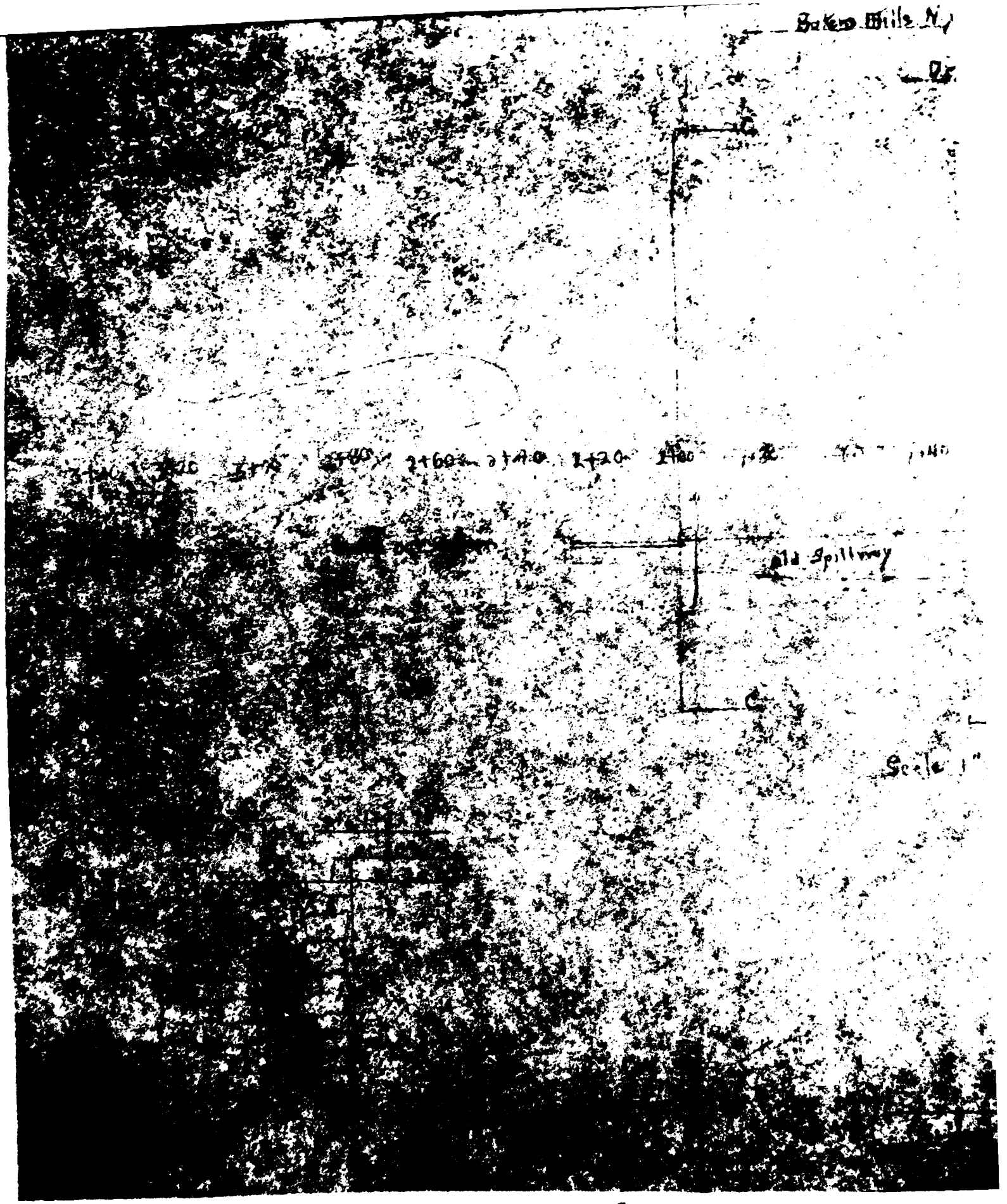
B
A
Section A-A
Scale 1/4" = 1'0"
A
B
A



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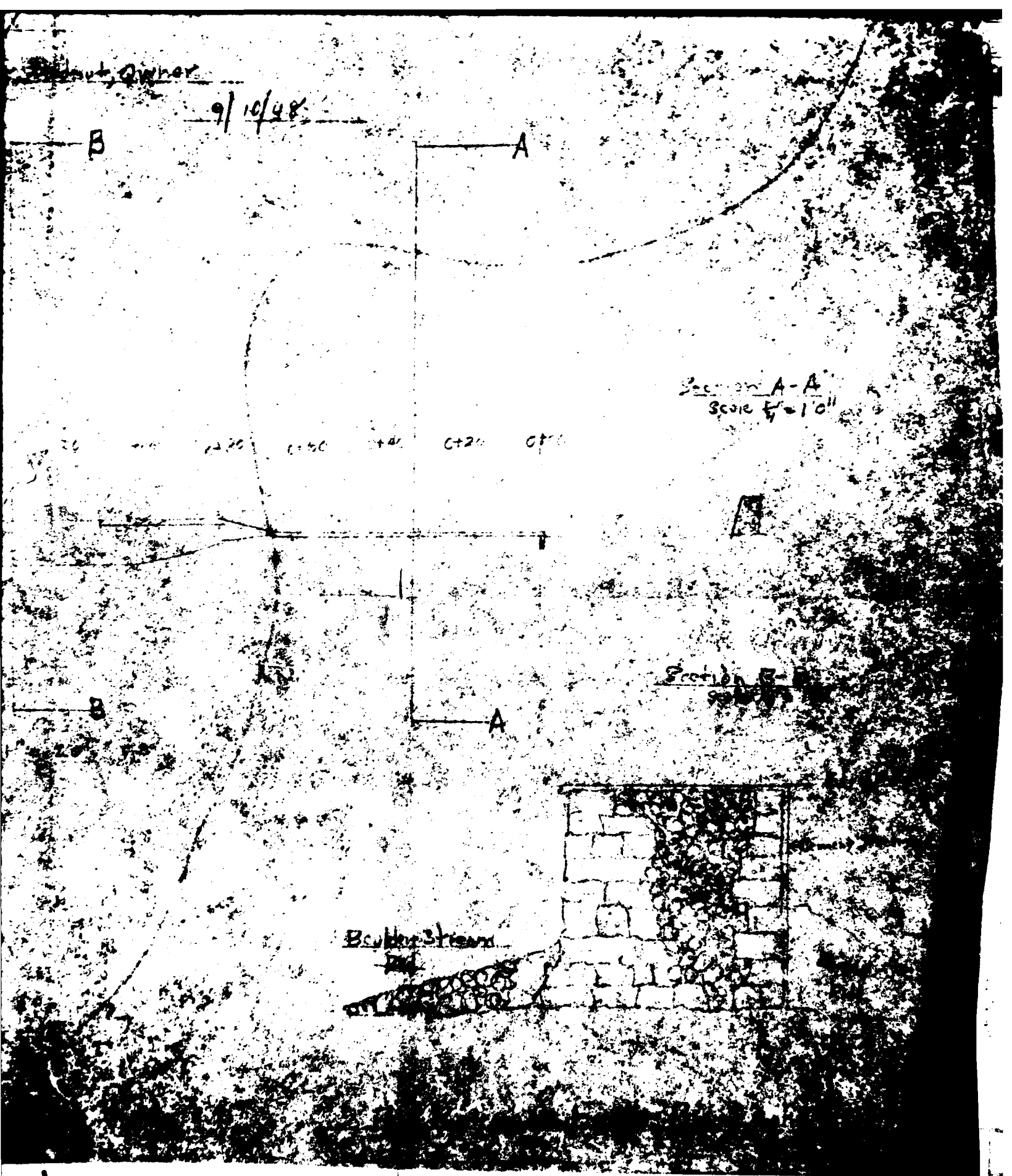
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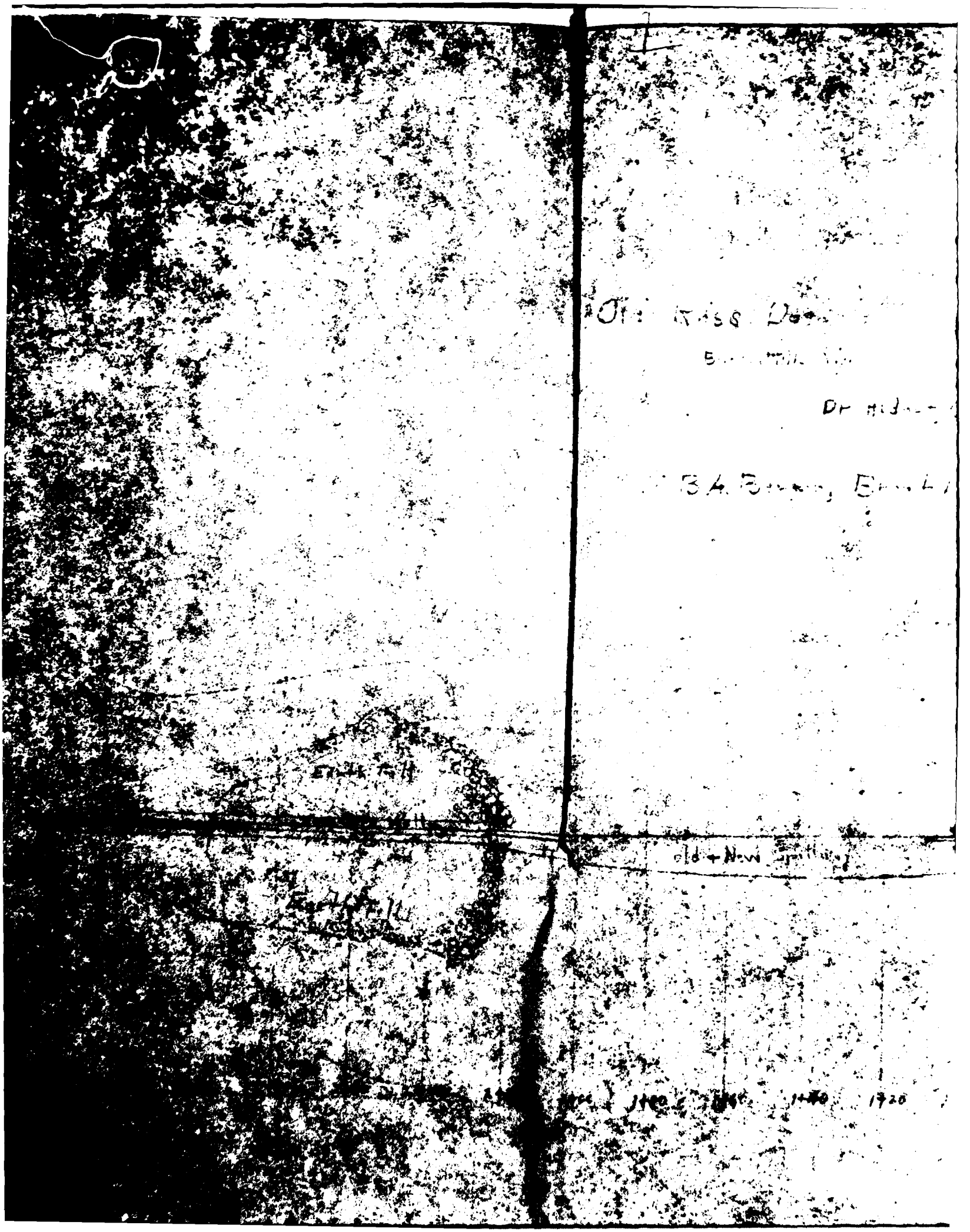
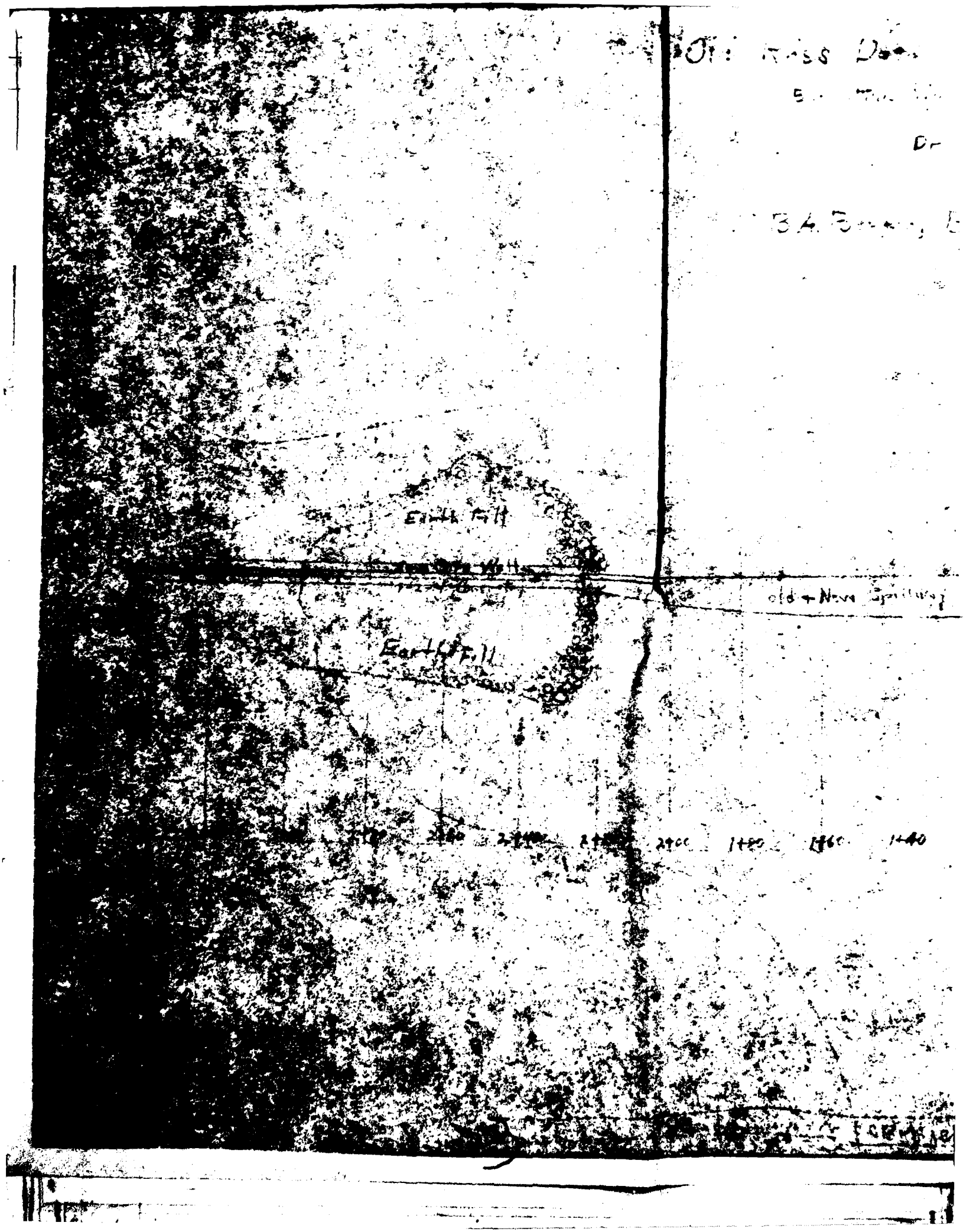
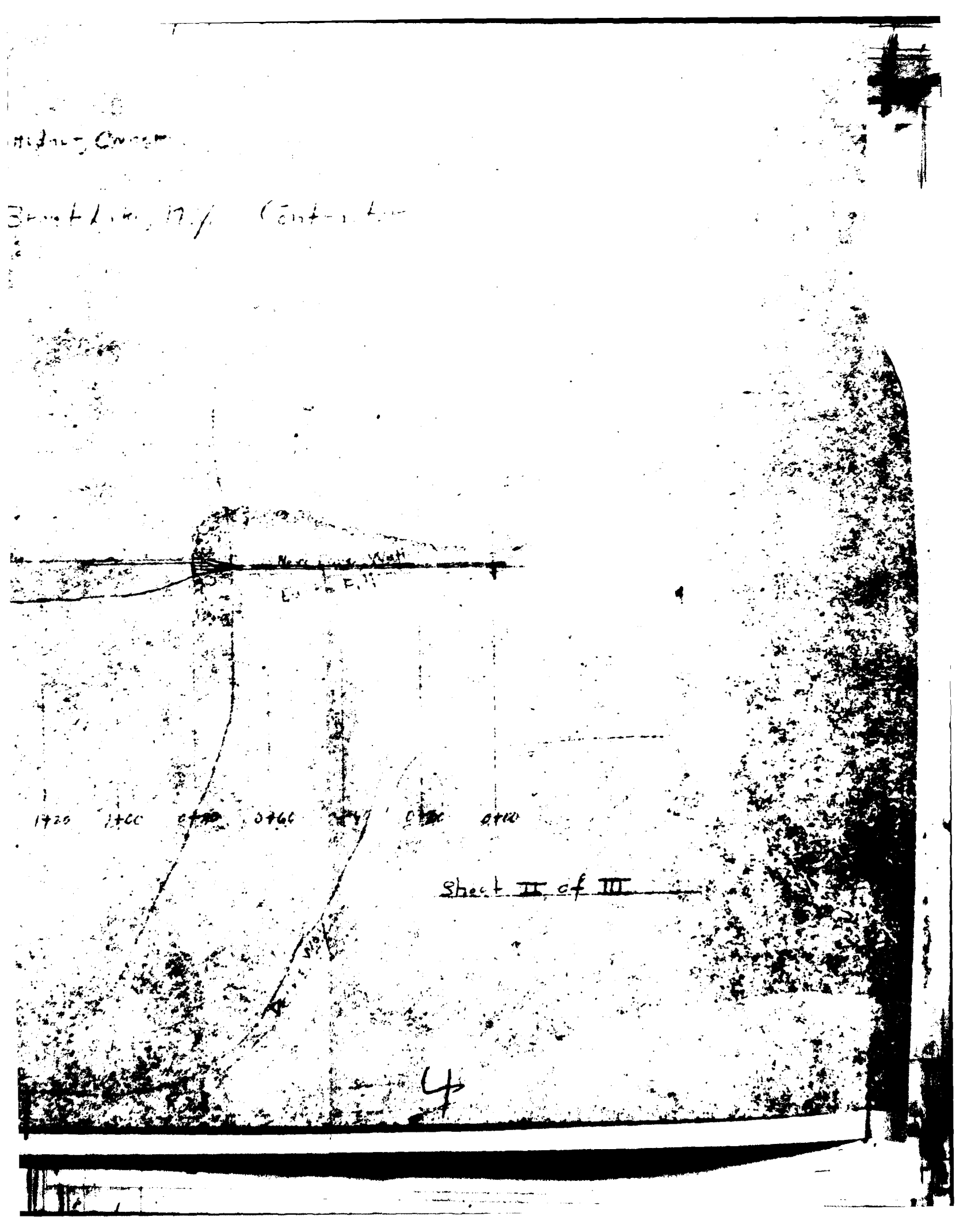
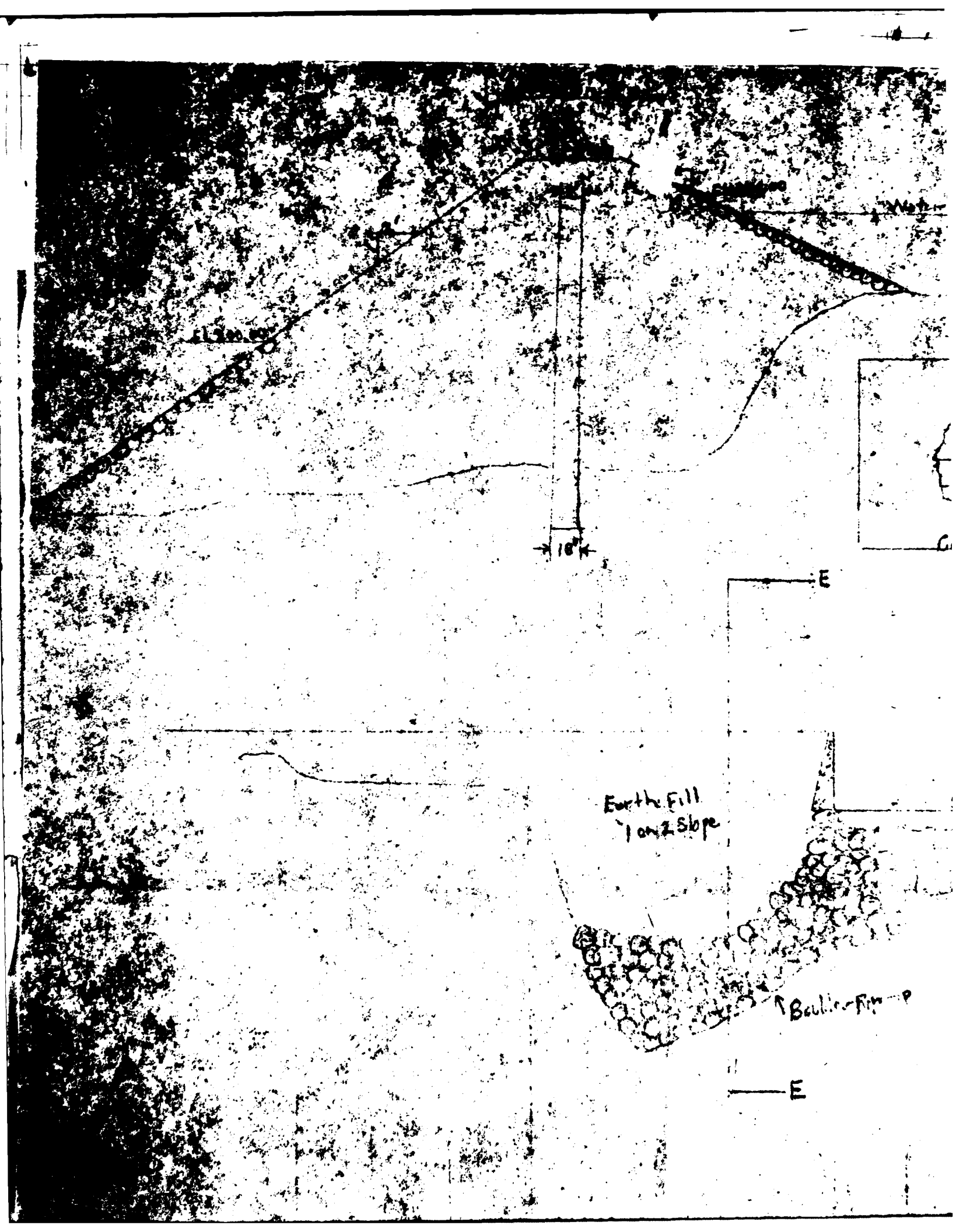
B
A
Section
Boulder Stream
Bed

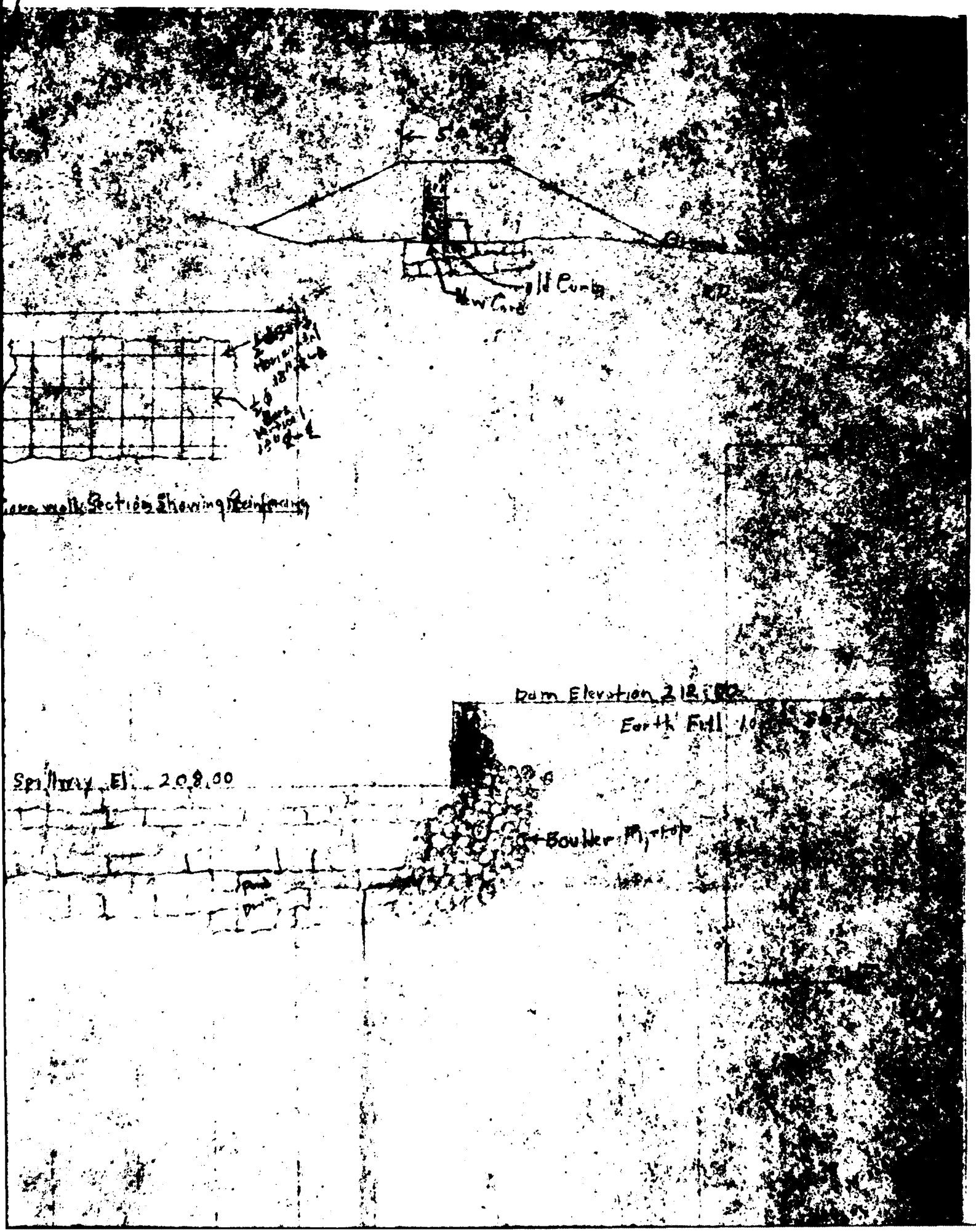


Sheet III of III

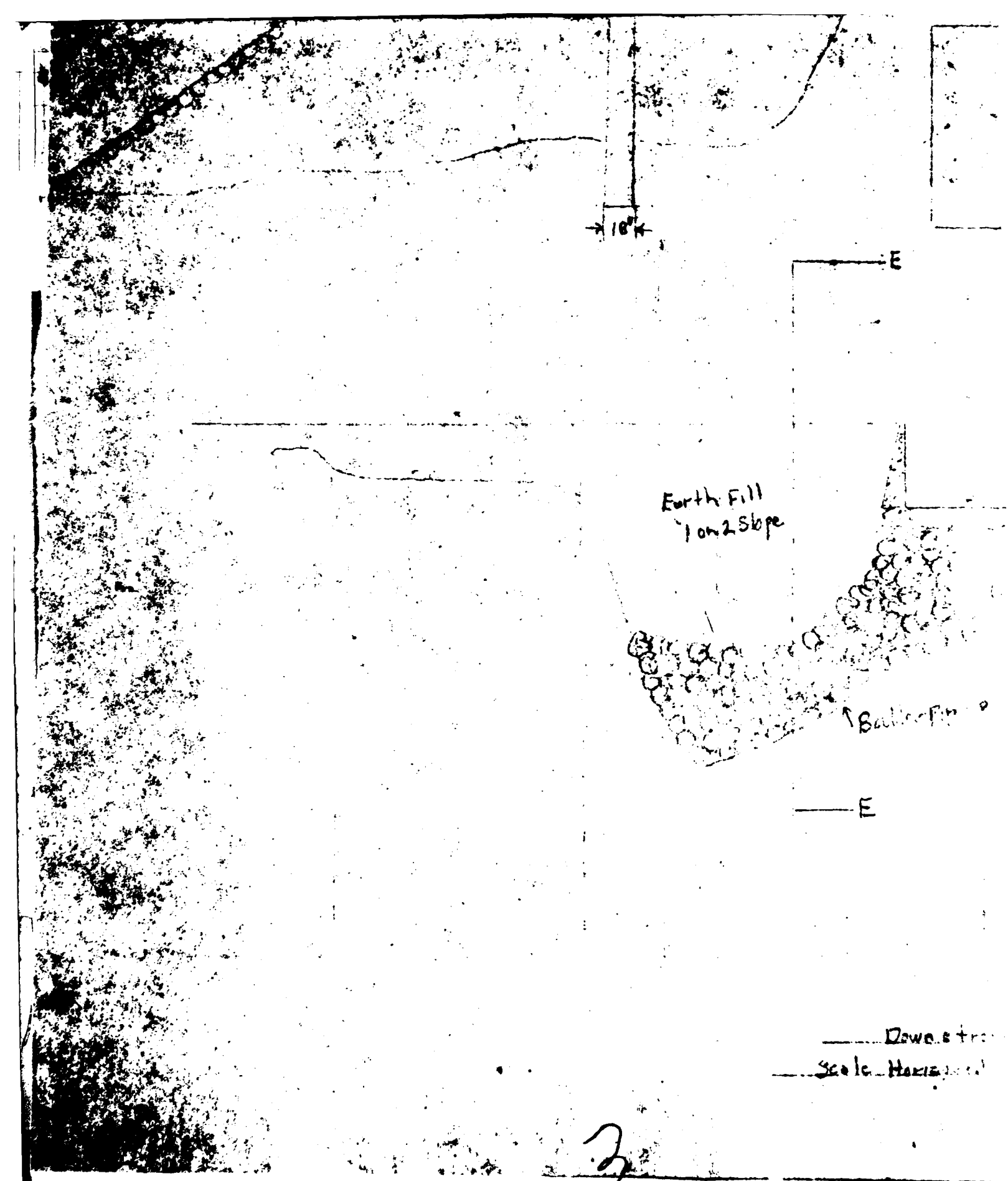

Earth Fill
Earth Fill
old + New Spillway
2400
1+20
1+60
1+40


1+20
1+00
0+80
0+60
0+40
Sheet II of III
4

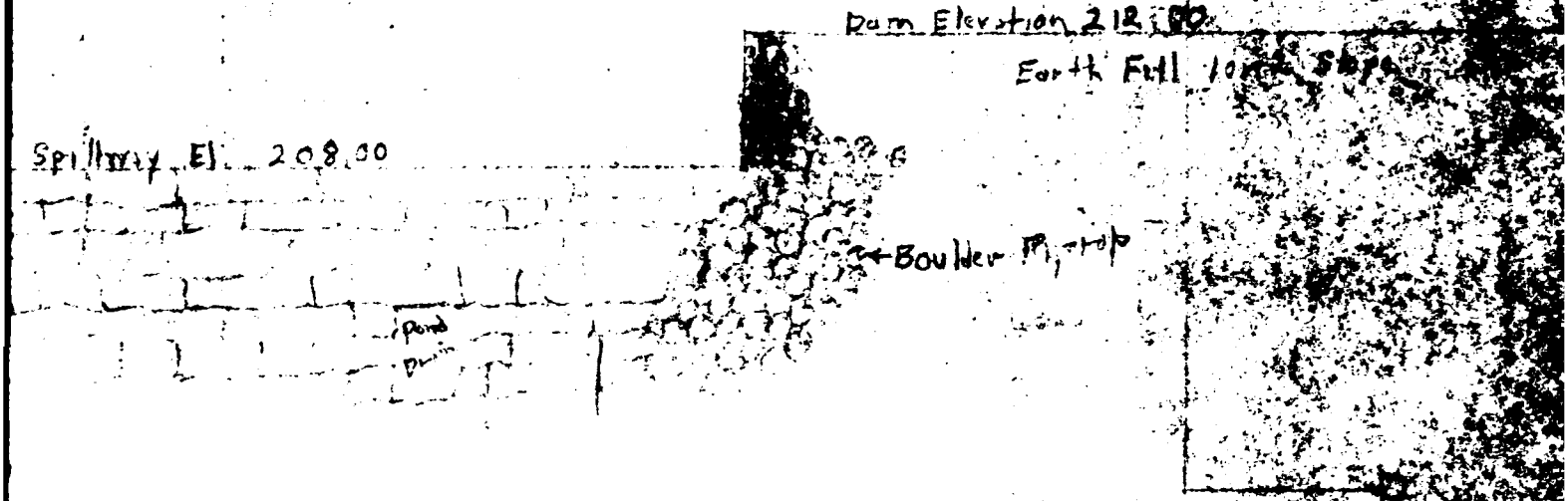

Water
1320.00
18"
E
Earth Fill
1 on 2 Slope
Boulder Rip-R
E



Cave wall Section showing Reinforcing


18"
E
Earth Fill
1 on 2 Slope
E
Downstream
Scale Horizontal

Core wall Section Showing Reinforcing



Sheet III of

Scale
1"=20' Vertical 1"=4'

Proposed Reconstruction
Old Ross Dam, Bakers Mills, N.Y.
Dr Hardwick, Owner
B.A. Barton, Contractor

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END